UNIVERSIDAD DE CÓRDOBA

Programa de Doctorado en Biociencias y Ciencias Agroalimentarias

CLIMATE CHANGE PERCEPTION IN COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT CONTEXTS.

Analysing cultural settings and environmental attitudes

Tesis realizada en el Departamento de Economía, Sociología y Política Agrarias para optar al grado de doctor con Mención Internacional de la Universidad de Córdoba, por la Licenciada en Sociología:

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TÍTULO DE LA TESIS: Climate change perception in community-based natural resource management contexts. Analysing cultural settings and environmental attitudes.

DOCTORANDO/A: Mª José Ambrosio Albalá

INFORME RAZONADO DEL/DE LOS DIRECTOR/ES DE LA TESIS
(se hará mención a la evolución y desarrollo de la tesis, así como a trabajos y publicaciones derivados de la misma).

La tesis doctoral realizada por Mª José (Pepa) Ambrosio Albalá cumple todos los requisitos necesarios para su presentación y defensa y avala a la doctoranda como merecedora del título de doctora.

La tesis se inició en 2012 financiada por el proyecto FP7-282845 COMET-LA (Community-based Management of Environmental Challenges in Latin America). En ese contexto se diseñó una investigación destinada a identificar las percepciones sobre cambio climático en dos de los casos de estudio del citado proyecto, los dos casos en los que la gestión comunitaria de los recursos naturales está más institucionalizada y por tanto las comparaciones son más factibles.

En estos 4 años, Pepa ha demostrado una gran capacidad para desarrollar investigación de forma autónoma, para explorar escenarios teóricos y metodológicos innovadores y actuales y para formarse y avanzar en esas técnicas.

El tema de investigación es de la máxima actualidad. En las últimas décadas se ha desarrollado una gran cantidad de conocimiento sobre los aspectos físicos y naturales del cambio climático, sin embargo existe aún un gran vacío en lo que respecta a los aspectos sociales y humanos del fenómeno. Dada la constancia científica de la influencia antropogénica en el cambio climático, investigar en estos aspectos se plantea como una necesidad acuciante. En este contexto, Pepa ha planteado una investigación valiente, que a pesar de enfrentar distintos obstáculos, ha concluido con unos resultados de elevado interés tanto científicos, como para la sociedad (local stakeholders) o para los que toman decisiones (policymakers). Conocer las percepciones de los habitantes de un territorio sobre el cambio climático es esencial para poder diseñar y ejecutar políticas de mitigación y adaptación al cambio climático que sean aceptadas y puestas en marcha por los mismos.

Esta tesis analiza estos aspectos en 2 países muy afectados por el cambio climático, México y Colombia, y en unas comunidades que tienen una especial relación con los recursos naturales y su manejo (propiedad colectiva de la tierra y los recursos naturales, y formas de gestión ligadas al conocimiento tradicional, la identidad territorial y a instituciones de base comunitaria y comunal), y por tanto pueden desempeñar un papel importante a la hora de abordar el fenómeno. Además

combina metodologías de análisis cualitativas y cuantitativas contribuyendo de esta manera al avance en el conocimiento, tanto metodológico como en cuanto a los resultados obtenidos. Adicionalmente, se resalta el esfuerzo adicional que implica el haber redactado todo el documento en inglés. El enfoque y los métodos de análisis empleados tienen unas elevadas posibilidades de replicación en otros entornos, como pueden ser España y otros países mediterráneos, en los que las predicciones los señalan como altamente afectados por el cambio climático.

La tesis opta a la mención de doctorado internacional y para ello Pepa ha realizado 2 estancias internacionales, una de 3 meses en la School of Psychology, de la Cardiff University, Reino Unido (becada por la Universidad de Córdoba) y otra de 2 meses en el Instituto de Geografía Romualdo Ardisonne, de la Universidad de Buenos Aires, Argentina (becada por la AUIP). Su formación se ha completado con la asistencia a 2 PhD summer schools: *Central European University Summer University: Adaptation governance: Spatial, Temporal, and Cultural constraints and Opportunities,* coorganizada por la Vrije Universiteit Amsterdam y la Alpen- Adria-Universität en Klagenfurt (Hungría) en 2013, donde presentó la comunicación *Community- Based management of Natural resources: the case of COMET-LA* y la *Summer School on Sustainable Climate Risk Management*, organizada por la Pensilvania State University, en 2015.

Los resultados de las investigaciones han sido presentados en 2 congresos internacionales: el *XIII World Congress of Rural Sociology. The new rural world from crisis to opportunities*, celebrado en Lisboa en 2012 donde presentó la comunicación *Analysis of Social Aspects and Organizational behaviour facing environmental challenges and climate change*, y la *Conference on Earth System Governance*, celebrada en Norwich en 2014 donde presentó la comunicación *Studying climate change perception. How to use science to raise awareness of climate change.*

Finalmente, se ha elaborado ya un artículo científico, *Towards an understanding of climate change perception in community-based management contexts* que ha sido enviado a la revista *Society and Natural Resources* y en estos momentos estamos en proceso de incorporar los cambios propuestos por los revisores. La tesis tiene una alta potencialidad para que de la misma puedan derivar otros artículos en journals de impacto, en los que también se está trabajando.

Por todo lo anterior, reitero mi firme convencimiento sobre la calidad de la tesis que se presenta y sus méritos para que su autora pueda optar al título de Doctora por la Universidad de Córdoba, con mención internacional.

Por todo ello, se autoriza la presentación de la tesis doctoral.

Córdoba, 16 de noviembre de 2015

Firma del/de los director/es

Fdo.: Mª del Mar Delgado Serrano

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"The result is never in question for me.

Just what path do you take to get there

And there is always one that is most right …"

Two roads diverged in a wood, and I-
I took the one less travelled by,

And that has made all the difference

The Road not taken, Robert Frost

RESUMEN

El cambio climático es una de las mayores amenazas globales hoy en día. Supone una amenaza a la resiliencia de las sociedades y particularmente a las comunidades cuyos medios de vida están expuestos a los cambios en las pautas climáticas. El rol que juegan los ciudadanos es importante ya que ellos generan y reciben los impactos del cambio climático. A medida que el discurso y las voces de los países en desarrollo y las comunidades más vulnerables se han incluido en la conversación del cambio climático, los estudios de percepción y su forma de entender el fenómeno son cada más valorados. Estos permiten averiguar qué puede fallar o qué puede resultar exitoso a la hora de plantear las estrategias de adaptación y mitigación del cambio climático. Junto con los factores psicológicos, la influencia del contexto cultural y social así como la relación de las personas con el medioambiente se consideran posibles factores determinantes en la percepción del cambio climático. En Latinoamérica este tipo de estudios también están despertando considerable interés. Sin embargo el número de estudios de percepción de cambio climático en comunidades indígenas y dependendientes de los recursos naturales como sus medios de vida es bastante escaso. Las comunidades indígenas y las personas ligadas a los recursos naturales son observadores clave de los cambios en la naturaleza y el clima, por lo que su conocimiento puede ser valioso para entender la magnitud del límite de riesgo futuro y para entender su capacidad de adaptación. Por todo ello y por la importancia de la región a nivel político, ecológico y cultural, los estudios de percepción del cambio climático en estas poblaciones son pertinentes y de suma importancia.

El objetivo principal de la tesis es identificar el imaginario social del cambio climático en las comunidades que dependen de los recursos naturales y que los gestionan de forma comunitaria en dos casos de estudio en México (Santiago Comaltepec) y Colombia (dos Consejos Comunitarios en el Alto y Medio Dagua, y Cuenca Baja del Río Calima). Desde el enfoque constructivista esta tesis mantiene que la percepción del cambio climático depende tanto de factores psicológicos como del contexto social y cultural. La percepción del cambio climático se construye socialmente a través del lenguaje, el conocimiento y la experiencia que las personas en las comunidades tienen con el cambio climático y con el medioambiente influyen.

Para la consecución del objetivo general, esta investigación se sirve de dos herramientas de tipo cualitativo y cuantitativo. Por un lado la Metodología-Q se utiliza para estructurar las posiciones subjetivas del cambio climático y para revelar las distintas visiones que existen sobre el cambio climático en las comunidades de estudio. Además, mediante un cuestionario se comprueba la relación existente entre las variables que tradicionalmente han predicho la percepción del cambio climático (sesgo cultural, nivel de información, familiaridad con la fuente del riesgo, actitud ambiental entre otras). El cuestionario se empleó también para comprobar la validez de la teoría

cultural del riesgo y el Nuevo Paradigma Ambiental en contextos de gestión comunitaria de recursos naturales, contextos que difieren del original para el que ambas teorías fueron diseñadas.

Los resultados de esta tesis corroboran que las personas dependientes de recursos naturales están percibiendo cambios en su propio territorio, según su opinión debidos al cambio climático. La mayoría de ellos perciben el cambio climático como algo cercano, que representa un riesgo y que afectará a ellos de la misma forma que a personas a nivel global. Reconocen además que el cambio climático está inducido por la acción del hombre. A pesar de ello aún tienen algunas dudas en cuanto al origen del cambio climático y al daño que éste puede llegar a causar. Como miembros de una comunidad que gestiona sus recursos naturales de forma comunitaria, se reconocen capaces de hacer frente al cambio climático pero a la vez demandan más participación de parte de las autoridades locales y de los gobiernos.

El uso de un enfoque constructivista, junto con el uso de la teoría cultural y el nuevo paradigma ambiental y las metodologías usadas han demostrado gran utilidad para la consecución del objetivo general de la tesis. Los resultados son de importancia para la comunidad científica y política. De éstos se puede concluir que: i) es necesario reconocer la diversidad cultural y social a la hora de diseñar estrategias de adaptación al cambio climático, ii) es necesario incluir a los miembros de las comunidades y a los usuarios de los recursos naturales en la gestión y en la adaptación de los estrategias de cambio climático a nivel local, iii) es necesario comprometer a la sociedad en los cambios necesarios de comportamiento pero sin imponer el tipo de estrategias y con las metodologías adecuadas, iv) es importante que la información que se transmite sobre el cambio climático sea clara y confiable para mejorar el entendimiento sobre el mismo, v) es importante encontrar mecanismos de restauración de confianza en los mensajes sobre el cambio climático que emergen de los científico y de los políticos, y vi) es conveniente adaptar la información y los canales de información a las necesidades y demandas locales.

SUMMARY

Climate change poses challenges to goals for social and economic policy. Climate change is widely perceived as threatening the resilience of communities worldwide, but particularly to the most vulnerable, like people whose livelihoods are exposed to changes in weather patterns. Significant attention should be paid to people whose livelihoods are based on natural resources, as they are highly vulnerable groups to climate change but also key actors to deal with it.

The study of climate change perception has been a burgeoning field since risks related to climate change, and extreme events became a cause of escalating public concern. As the importance of developing countries and the vulnerable communities has been considered in climate change conversation, studies have focused on them. Less research has been carried out in the field of perception of climate change among indigenous communities. Indigenous communities are key observers of the changes in nature and climate. In Latin America perception studies have experienced considerable growth in recent years Yet it remains an unexplored context that must be taken into account given the cultural and ecological significance of climate change in the region.

This thesis is based on the precept that perceptions not only can be psychologically but also socially constructed. Knowledge, language and experience can influence the way people perceive and construe climate change. The central objective of the research is to identify the social imaginary of climate change in communities that depend on natural resources for their livelihoods and manage them collectively. The research focuses on two case studies in Mexico (Santiago Comaltepec) and Colombia (Consejos Comunitarios de las Comunidades Negras del Alto y Medio Dagua and Bajo Calima). The dependence of natural resources and the geographical location, make the communities prone to suffer climate and environmental changes.

For the purpose, the cultural theory of risk and the new environmental paradigm was used gauged the cultural settings and the environmental attitudes. The research applies two qualitative and quantitative methods. Q-Methodology is used to structure the subjective opinions and disclose common viewpoints on climate change. A questionnaire is used to check on the relation between variables predicting climate change perception. The questionnaire was also used to check on the validity of traditionally used measures and the theory of risk and environmental attitudes on contexts where people depend on climate-sensitive resources.

Overall results of the thesis have proved that people in communities dependent on natural resources are already experiencing changes in the environment, probably due to climate change. Most of them produce imagery of impacts on places and people who are both closer and spatially distant. The research results suggest that the communities in both case studies consider climate change as a threat. The majority of people acknowledge the influence of human actions inducing climate change. They display support for national and local policies and interventions to tackle climate change that goes in line with the institutional structure in their territories. Strong majority exhibits concern about natural resources and the environment and therefore they will be willing to change behaviors. These facts show the complex assembly of configurations that make up a viewpoint and the fact that individual preferences may be reflected by perceptions too.

The combination of the constructivist approach, together with theories –cultural theory and the New Environmental Paradigm- and methods –Q-methodology, network analysis and questionnaire- proved to be suitable to validate the hypothesis that climate change perception is socially constructed.

A number of implications and recommendations emerged from this research in view of results and discussion of the thesis being: i) to recognise the local cultural specificities and not to impose one-size-fits-all climate change adaptation strategies, ii) to locally adapted climate change adaptation strategies by recognising people's ways of understanding the climate change phenomenon, iii) to engage society in the necessary behaviour change without imposing actions, iv) to deliver clear and trustful information about climate change to enhance public understanding of climate change, v) to find ways to restore the confidence in the messages delivered by policymakers and scientists, vi) to adapt the information channels and methods to deliver information of climate change and related policies to the different cultural contexts and cultural biases.

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INTRODUCTION

The knowledge of social factors causing individuals to internalize, react or deny the reality of climate change has emerged as a new and crucial area of research. Climate change is not merely a scientific issue, but rather it passes through the filter of people's mind, and this raises the issue of risk perception (Loewenstein et al. 2001, Weber 2010). What do people think the risk resulting from climate change might be? How important is it to respond to these risks? Should society respond to these before or after they occur? These questions revealed the multiple ways in which risk is associated with climate change and the several levels of adapting and mitigating it (Burch and Harris 2013).

People are both drivers and receivers of climate change impacts. Several human actions have put the Earth in a state of degradation and loss of biodiversity (UNEP 2012). The way people choose to grow urban areas, produce food or develop their lives has a direct impact on the planet and it will determine the level of climate change people ultimately will experience (Burch and Harris 2013).But also the role of governments and companies is crucial.

Climate change is leading to unexpected and abrupt changes. As extreme events become frequent, both animal and human welfare are increasingly affected. The consequences for forests, marine ecosystems, and the coast will be major, resulting in water stress periods, loss of biodiversity and species and erosion (Stern 2006). Not only environmental resources are in danger but also people's live (Sukhdev et al. 2010). Periods of severe floods and droughts are affectingquality and quantity of available water resources adversely, hence the quality and availability of agricultural products and therefore food (*IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* 2014). The impacts will progressively affect the daily lives of people everywhere in terms of employment and livelihoods, health and nutrition, water, food security and housing. A large part of the world's population is already facing significant risk from climate change, many of them living in developing areas.

As the processes of industrialization continue in developing regions, climate change is expected to affect economic sectors at a global scale. The industrialization processes in which developing regions find themselves have made them particularly vulnerable targets. Developing countries are facing the dilemma of having to combine a profitable economy with productive development, along with the need to protect and preserve their natural

resources. Although CO_2 emissions are expected to decrease in developed countries, the trend is opposite in developing countries. These regions are highly exposed to the adverse effects of climate change, also to the little scope for action when comparing to developed countries (World Bank 2010). Despite the fact that Latin America contributes relatively little to global greenhouse gas emissions the region is highly vulnerable to climate change (Familiar 2014). Here, those dependent on climate-sensitive resources, farmers and fishers, indigenous and small communities are impacted by changes in the climate and are at the greatest risk (Berkes and Jolly 2001).

The core justification to approach climate change at the local level is very straightforward. A small fraction of the world population produces the vast majority of the world emissions that drive global climate change (Burch and Harris 2013). In the climate change scenario, indigenous and small communities warrant particular attention. Vulnerabilities of climate change are close to cultural connection and local species and ecosystems (Maldonado et al. 2013, Whyte 2013) The study on how climate change could impact small communities, and people dependent on fragile ecosystems has been recommended by the United Nations Permanent Forum on Indigenous Peoples in 2008. Due to the reliance on natural resources, climate change poses a threat to many indigenous communities in particularly vulnerable environments. These communities are victims of actions from industrialized countries. Climate change is expected to hit them partially due to their predominant dependence on natural resources and because they have less capacity to adapt and protect themselves. The communities that manage natural resources are critical actors in the management of environmental challenges such as climate change (Armitage 2005). Yet they are considered helpless (Nakashima et al. 2012). The indigenous communities have traditionally adapted to variations in their environment, combining different types of knowledge for learning, and creating opportunities for reorganization (van Aalst et al. 2008, Boillat and Berkes 2013). Their ability to respond successfully to changes has proved to be influenced by learning to live with uncertainty. The role of indigenous and communal knowledge in detecting, addressing and dealing with climate change is recognized. The indigenous knowledge and the bonds with nature contribute to building resilience and buffer communities against climate change effects (Salick and Ross 2009, Smith and Sharp 2012). The knowledge gained and accumulated by communities throughout the years offers an alternative pathway towards sustainability and climate change adaptation. Using the knowledge could be valuable for climate predictions, adaptive knowledge, and policymaking because it stands on local acceptance (Roncoli et al. 2008, Lefale 2009).

Networks of reciprocity and ties to the environment enhance the ability to cope and deal with weather-related and environmental hazards (Lorenzoni et al. 2007, Wolf et al. 2013). Particularly, effective experiences can be found in -indigenous- communities closely connected to and dependent on natural resources managed through a community-based system (CBNRM) (Gruber 2011, Chaudhary et al. 2012). The CBNRM is an approach to conservation and development that recognises the rights of local people to manage and benefit from the management and use of natural resources. The logic behind CBNRM is based on participation, trust building, mutual learning and exchange that enhances the involvement of community members in decision-making. These elements are of importance for climate change adaptation. People applying CBNRM have relevant knowledge about resource management and they consider the differences and conflicting values of the multiple groups involved in the communal management (Buckles and Rusnak 2000).

Therefore, people could suggest solutions for problems with natural resources or climate change from their own initiative, experience, and knowledge. Consequently, it is essential to comprehend local communities' perception and to include it in the design of climate change strategies for key stakeholders. Hence, there is high need to understand not only how vulnerable they are but also the capacities they have to adapt and mitigate climate change based on their particular views (Whyte 2013). Here, understanding how each community comprehends climate change is crucial. It is relevant to know how they explain and give meaning to environmental changes, what does they represent for each community, and how each community differs in needs.

1.1 The importance of climate change perception

The study of perception and knowledge has gained prominence in discussions of climate change (Codjoe and Owusu 2011). Since the late twenty-century climate change has emerged as an issue that has been taken up and debated by scientist, politicians and concerned citizens. Studies of climate change perception are critical in the design and communication of action on climate change. Comprehending how people construe climate change lays the ground for designing adaptation and mitigation policies and strategies (Roeser, 2012; Stedman, 2004). The results of climate change and risk perception studies improve communication between decision makers and citizens and can even help anticipate and allow public response to risk events.

Discussion and effort to design an equitable climate change policy has come to dominate the environmental agenda pushing issues like water scarcity, pollution, and deforestation

deep into the background of public consciousness (Sukhdev et al. 2010, Lambin and Meyfroidt 2011, UNEP 2012a, World Economic Forum 2015).

The issue of how society responds to climate change defies simplification. The challenge of coping with climate change brings together stakeholder with both consistent and inconsistent values and priorities: industries, governments, media, the scientific community and lay public. None of these stakeholder groups are homogenous and they are often difficult to characterize. The industry may or may not have interest in perpetuating a fossil fuel-based energy sector. Governments have played a key role in the climate change debate because the majority of climate change policies have been developed at the international level (UN 1998, UNFCCC 2010, Metz 2013). Sometimes, this excludes individuals and even non-state actors. As well, governments have an important role to play implementing and legislating on climate change. The role of the scientific community is shifting. While they have been traditionally seen as objective or neutral parties, science is sometimes recognised as a value-laden practice (Grundmann 2012, Myanna 2012, Lewandowsky et al. 2013, 2013, 2015). It can be said that this may cause a disconnection between the understanding and the reality of climate change issue. The media has also emerged as a central actor in the climate change debate. This has dramatic influence on framing of the issue (Morton et al. 2011, Whitmarsh et al. 2013).

The public (society) is beyond doubts an important key in the climate change debate. The public encompasses individuals affected by climate change impacts and also those whose lifestyle has benefitted from the consumption of fuel, responsible for the majority of emissions. The public also includes those who are very informed and active in the climate change conversation (McFarlane and Hunt 2006), those who have little access to climate change information and those with no inclination to participate in public decision processes (Rahmstorf 2004).

In this context, the role of people is important in two ways. First, it is in their hand to start changing unsustainable behaviors, and secondly they are the key actors of climate change politics (Oltra et al. 2009). However, significant attention should also be paid to people whose livelihoods are based on natural resources, as they are highly vulnerable groups to climate change but also key actors to deal with it.

The extent to which people understand the risk, how much people know about climate change and the degree to which the issue is cast in terms of doom and dread, directly influence the perception of the risk as well (Malka et al. 2009). Climate change perceived as a threat depends on how society values both security and risk. Even when people perceive

a risk to be severe, they may not act to protect themselves against it or to prevent the risk from occurring.

Not only psychological aspects influence and determine the perception of climate change. Some risks, such as climate change, attract more attention than others not only because people are affected but also because society constructs it as such. To do so elements such as the language people use, the information people receive and even if they have previously experienced the risk could influence a positive or negative predisposition to perceive climate change.

Human behaviour is a complicated phenomenon and needs a careful analysis. If evidence exists that climate change is a problem, and many people perceive the risk to be happening, the question is why changes in behaviour are not automatic. Underlying values and emotions are central in determining which behaviour people choose and even the success of climate change information campaigns (Archie et al. 2014, Corner et al. 2014). Furthermore, the context in which people live may present significant external barriers to behaviour change (Kollmuss and Agyeman 2002, Moser and Ekstrom 2010). In the end, humans are not simply rational.

Casting climate change as a value and context-based issue brings some challenges. A moral or ethical framing of climate change brings cultural differences to the fore such as variance perception of human rights, political pathways and even religious beliefs (Adger et al. 2006, Haluza-DeLay 2014). All these differences should be taken into account when designing a robust climate change intervention strategy. The guiding question to answer is whether the climate change strategy and decisions are ethically defensible. Here, when ethical and epistemic values converge is when climate change perception studies in small and vulnerable communities become meaningful.

1.2 Background to climate change perception studies

The study of climate change perception has been a burgeoning field since risks related to climate change, and extreme events became a cause of escalating public concern (Capstick et al. 2015). During the last two decades a growing body of literature and research has focused on understanding how people respond to risk (Fischhoff et al. 1978, McDaniels et al. 1995, O'Connor et al. 1999, Leiserowitz 2005, Whitmarsh and Lorenzoni 2010, Agho et al. 2010). Influences of culture and environmental beliefs in perceiving climate change have been also included in research assessing climate change perception (Steg and Sievers 2000, Adger et al. 2013, McNeeley and Lazrus 2014, van der Linden 2015).

Traditionally subjects in climate change and risk perception studies were politicians, lay public and students in Western societies (Leiserowitz 2003, Whitmarsh 2005, Reynolds et al. 2010, Agho et al. 2010). Less research has been carried out in the field of perception of climate change among indigenous communities. However, as the importance of developing countries and the vulnerable communities has been considered in climate change conversation, studies have focused on them (Salick and Byg 2007, Salick and Ross 2009, Boillat and Berkes 2013, Crona et al. 2013, Codjoe et al. 2013). Albeit with exceptions, in Latin America perception studies have experienced considerable growth in recent years (Echeverri 2009, de los Rios and Almeida 2010, Sánchez-Cortés and Chavero 2010).Yet, it remains an unexplored context that should be taken into account given the cultural and ecological significance of climate change in the region.

Perception of magnitude and likelihood of a risk impacting someone's life is a product of a constellation of factors. Many of these are not related to the objective nature of the risk, for example, extreme weather events, drought and rising sea levels (Arrow 1982, Breakwell 2010, Chen et al. 2011). Several demographic characteristics affect the exposure to risks, helping to determine both the activities that make people be impacted and the perception people have about the hazards (Raphael et al. 2009, Jones et al. 2010). Day to day activities may or may not put people in contact with these dangers.

Climate change perception is found to be culture specific (Capstick et al. 2015). In the same study, researchers present data about trends in the perception of climate change in the last decades. Results showed that between 1980 and 1990s, the studies published showed a rapid increase in awareness of climate change among society. Following the same trend cross –national polls showed an increase of international concern until the year 2000. This tendency was reversed from that moment on with a rise in scepticism. Events like the climate gate (Grundmann 2012, Maibach et al. 2012) and the politicization of climate change (Whitmarsh 2011) could have been causative influences.

Nowadays, public awareness of global warming is now growing. In 2007-2008 Gallup poll surveyed individuals from 128 countries worldwide. Results show that public awareness of global warming is higher in developed countries than in less developed countries: countries knowing more about climate change were Japan, Finland, and the United Kingdom, where not less than 3% of respondents stated that they know about climate change. People were asked about the origin of climate change, Latin Americans lead the world in believing that climate change is caused by human activities (Pelham 2009). Also, the Americans and

Europeans are most likely to perceived climate change as a serious threat while Asians are the least liable to state that climate change is a serious threat.

In terms of methodology, climate change and risk perception studies have used a wide variety of methods and techniques (Boholm 1998, Sjöberg 2000b). However, methodologies in Latin American climate change perception studies differ from those used in Western contexts. While here researchers have predominantly used quantitative methods, the study of climate change in indigenous communities in Latin America have mainly used qualitative methods (Forero et al. 2014).

Regarding the content, research on the perception of climate change in Latin American communities' reports an increase in temperature and decrease in rains (Echeverri 2009). The increase in heavy storms and hurricanes, change in rain pattern and decrease in availability of water resources have been reported (Kronik and Verner 2010). Research has shown that indigenous peoples and small communities see changes in landscape, increase in temperature, and new plagues and diseases in their territory (Ulloa et al. 2008, García et al. 2011, Correa et al. 2012). In general, Latin American indigenous communities have a dynamic vision of nature and perceive how nature had changed over time (Perez Conguache 2008, Ramos García et al. 2011). Kronik and Verner (2010) found that the lack of State support causes Latin American communities to fail in finding answers to their needs regarding climate change. This underlines the urgent need to propose strategies tailored to the context in which communities live linked to their culture and other related livelihood strategies (Bonatti 2007, de los Rios and Almeida 2010).

1.3 Framing the thesis

In order to comprehend how climate change and short term climatic variation may affect globally, indigenous and small communities' views may be included within the climate change conversation.

The thesis seeks to understand how perceptions are constructed based on the cultural and social context in two indigenous communities where people depend on natural resources, and the management is community-based.. For the purpose, the cultural theory of risk and the new environmental paradigm was used gauged the cultural settings and the environmental attitudes.

The research applies qualitative and quantitative methods. It was considered that quantitative measures would usefully supplement and extend the qualitative analysis. Q-Methodology is used to structure the subjective opinions and disclose common viewpoints on climate change. A questionnaire is used to check on the relation between variables

predicting climate change perception. The questionnaire was also used to check on the validity of traditionally used measures and the theory of risk and environmental attitudes on contexts where people depend on climate-sensitive resources.

The research focuses on two case studies in Mexico and Colombia, selected in the context of the project COMET-LA of the European Commission Seventh Framework program. These areas were chosen because of their abundance of natural resources, their relation with nature (both cultural and for livelihoods), their collective property of the resources and their community-based natural resource management. The dependence of natural resources and the geographical location, make the communities prone to suffer climate and environmental changes.

The Colombian case study is based on the Consejos Comunitarios de las Comunidades Negras del Alto y Medio Dagua and Bajo Calima. Both Community Councils are part of the municipality of Buenaventura in the biogeographic region of Chocó, internationally renowned as a biodiversity hotspot and for its abundance of freshwater (Arbeláez-Cortés 2013). The zone has strategic environmental, geopolitical and economic positioning. The communities have a long history of associativity but have only had the rights to manage their lands communally since a decade ago, and the CBNRM is in its initial stages. The Law 70/1993 of the Colombian Constitution granted collective property rights to lands and resources to both councils in return for sustainable management. The connection with nature is a central axis of community life and reinforces the territorial identity. Natural resources are the base of the economic activities hence being the population highly dependent on them. However, the lack of other incomes and job opportunities and the external pressures often force the communities to choose between managing resources sustainably and making the resources their livelihood.

The Mexican case study is based on Santiago Comaltepec. This is a Chinantec indigenous community located in the Sierra Norte of Oaxaca, in the Mesoamerican bio-cultural region. The community has a high environmental awareness. They exploit only a small part of the forest commercially, leaving the rest under an environmental protection system. The area is known for the successful conservation of its forest. Subsistence agriculture and community-managed logging support the economy. The community has collective land and forest property rights granted by the Agrarian Law of 1953, yet the community has managed their lands according to a customary governance regime for centuries.

Colombia and Mexico are and will be impacted by climate change (IPCC 2014a). Parts of the territory are collectively managed and highly biodiverse. Both case studies coincide and

differ in some elements. They both have a strong cultural identity; they collectively own the natural resources in the territory and are reliant on natural resources as livelihoods. Nevertheless, the tradition of managing the resources is quite different. In Santiago Comaltepec the management tradition dates back decades ago, while in Consejos Comuntiarios had no more than fifteen years. Santiago Comaltepec and Consejos Comunitarios are also exposed to conflicts and pressure from external and internal actors in the territory. Also, Santiago Comaltepec is a more cohesive society than Consejos Comunitarios that is more exposed to external influences. Social norms are more respected in the Mexican case study, where they are also more administratively independent from the National government.

The changes in the environment may affect communities in both case studies as it is already occurring in other communities with similar characteristics. Many of these people's livelihoods and general well-being can be impacted by climate change and short term climatic variation and this can have social implication. Even though local knowledge can be valuable the magnitude of future hazard may limit their capacity to adapt. . Indigenous communities are key observers of the changes in nature and climate. Hence to understand whether they have perceived changes and how they build their perception is an important issue.

1.3.1 Contributions of the thesis

This research presents an original approach to understanding how people dependent on natural resources that they collectively manage perceive climate change. It presents a significant contribution and opens new paths for research in terms of the object and subject of study, context, theory, and methodology.

In the field of climate change perception studies, community-based management contexts and indigenous communities have been relatively unexplored and the role these communities play in adapting to climate change is noteworthy.

This thesis contributes to knowledge in risk perception studies too. As a cross- national comparative study of two case studies, the research helps linking perception at a local but also at a global level. The research approximates to climate change taking into account most of the dimensions that comprise it: cultural, environmental, and social. So that climate change can be understood, trying not to leave any aspect of the climate change reality aside. Outcomes can be relevant for other communities, for Colombia and Mexico, and other countries with similar characteristics.

By testing the cultural theory of risk and the new environmental paradigm in contexts different from where they were originally designed, it draws conclusions on how appropriate it is to address climate change from a cultural perspective and considering environmental attitudes. The usefulness of both theories has been checked and validated in their respective fields since its inception. However, they have not been used in a context like this research. The research also sheds light on the closeness and distance people in the communities establish with climate change.

This thesis entails an innovation in methodological terms. It integrates qualitative analysis and quantitative survey methods and helps approach the issue of climate change perception from a holistic perspective. As mentioned before, in Latin America quantitative methods are not commonly applied in climate change perception studies in indigenous communities. Including a questionnaire as a methodological tool to quantitatively measure climate change is then an innovation. However, this is also a qualitative research. Qualitative methodology is included by exploring various meanings and the subjectivity behind climate change perception. This methodology gives insight to a more accurate reflection of local views. From the analysis, patterns on climate change definitions were established.

Furthermore, the joint use of both methods is a novelty as it integrates quantitative and qualitative dimensions on the logic of perceiving climate change. Qualitative analysis provides the rationale to identify the language and notions people use in the communities to refer to climate change. The quantitative analysis established a relation between determinant variables and helps to identify patterns. Another important aspect of the research is the combination of both theories and methodologies. The integration of Q-Methodology and cultural theory allows comprehending the construction of climate change in the communities and helps to understand how cultural settings influence it.

1.3.2 Research question and objectives

This thesis is based on the precept that perceptions not only can be psychologically but also socially constructed. This meaning that knowledge, language and experience can influence the way people perceive and construe climate change. The all-encompassing research question for the thesis is: how indigenous people in communities where natural resources are collectively managed perceive and construe climate change perception?

The central objective of the research is to identify the social imaginary of climate change in communities that depend on natural resources for their livelihoods and manage them collectively. Six specific objectives will help achieving the primary objective:

- SO1: To identify the common building-blocks for assembling the concept of climate change in people dependent on climate-sensitive natural resources
- SO2: To scan and identify the various climate change visions in the communities.
- SO3:To identify the influence of the cultural and social contexts and the environment in perceiving climate change by determining differing and common elements in both communities.
- SO4: To test and provide recommendations for the use of cultural theory and new environmental paradigm scales in the context of community-based natural resource management
- SO5: To adapt and offer advice to the use and application of Q-Methodology in community-based natural resources management contexts.
- SO6: To provide recommendations for policy-makers and scientific community and to suggest areas for future research based on the results.

To meet the objectives, the approach used was both qualitative and quantitative. The Q-Methodology and a questionnaire (survey methodology) were used to elicit the perception of climate change. Q-Methodology structured the subjective opinions and disclosed common viewpoints of climate change. The questionnaire examined a range of variables influencing the perception of climate change.

1.4 Structure of the thesis

The thesis has eight chapters each. Table 1 below shows how each chapter gives answer to the specific objectives.

Table I 1 Structure of the thesis and the specific objectives

CONTENT	SPECIFIC OBJECTIVES
Chapter 1: Scientific and historical evidence of climate change	
Chapter 2: The social construction of climate	SO1: To identify the common building-blocks for assembling the concept of climate change in people dependent on climate-sensitive natural resources SO3: To identify the influence of the cultural and social contexts and the environment in perceiving climate change by determining differing and common elements in both study communities.
Chapter 3: Them, the peoples	
Chapter 4: Methods	SO2: To scan and identify the various climate change visions in the communities. SO3: To identify the influence of the cultural and social contexts and the environment in perceiving climate change by determining differing and common elements in both
Chapter 5: Understanding subjectivity behind climate change perception	SO1: To identify the common building-blocks for assembling the concept of climate change in people dependent on climate-sensitive natural resources SO2: To scan and identify the various climate change visions in the communities. SO3: To identify the influence of cultural/social contexts and the environment in perceiving climate change by determining differing and common elements in both
Chapter 6: The quantitative side of climate change	
Chapter 7: General results and methodological	SO4: To test and provide recommendations for the use of cultural theory and new environmental paradigm scales in the context of community-based natural resource management SO5: To adapt and offer advice to use and application of Q-Methodology .in CBNRM
Chapter 8: Conclusions and final remarks	SO6: To provide recommendations for policy-makers and scientific community and to suggest areas for future research based on the results

The chapters of this thesis are structured in the following manner: Chapter 1 reviews the historical context, scientific evidence, current and expected impacts, and consequences of climate change worldwide, in Latina America and particularly in Mexico and Colombia. Following, in Chapter 3 both case studies are described. Chapter 2 describes the literature review of the research. It comprises conceptual and theoretical positions relevant to the thesis. Chapter 4 describes the methodology used in the thesis. It first describes the Q-Methodology followed by the survey research. Results and their correspondings discussion are presented in Chapter 5 and 6 corresponding to the methodology and type of analyses used. The former chapter gives a qualitative understanding of climate change and the latter presents results of the questionnaire. Chapter 7 provides summarizes the key findings and discusses the methodological results of the research. Finally, Chapter 8 summarises arguments of this thesis, presents research limitations and offers recommendations for further studies. Annexes with the data of the study is included in the final part of the document

Chapter 1

SCIENTIFIC AND HISTORICAL EVIDENCE OF CLIMATE CHANGE

This chapter describes how climate change has emerged as an area of outstanding importance in the political and cultural field. Also, scientific facts of climate change are presented. To better understand climate change in the context of the study, impacts and projected effects of climate change are outlined in the case of Latin America and particularly in Colombia and Mexico. This chapter provides as well insight into the responses to lessen and confront the impacts of climate change effects.

1.5 The climate change historical background

Climatic surveys were initiated in the first half of the eighteen century. It was then when Fourier mentioned "terrestrial temperature" for the first time (understood as the greenhouse effect). Meteorological and climatological speculations of Tyndall and Arrhenius on the unequal gases absorption of the atmosphere and research on the carbon dioxide and climate, set the basis for the first attempt to explain temperature changes (Rodger Fleming 1998). At the beginning of the twentieth century, the man action was acknowledged as the cause of changing composition in the atmosphere (Callendar 1938). According to Callendar, the humanity sped up natural processes and had interfered with the carbon cycle. On the 1950s was the first time for the public agenda to recognize global warming and expressing concern about changing climates, loss of habitats and shift in agricultural areas. Scientists started speaking for the first time about carbon dioxide exchange between the atmosphere and the ocean. Since then the global climate change has become an issue of concern. From the 1960s, new methods using electronic computers for quantitative weather forecasting and carbon dioxide measurement allow for global climate studies. With the publication of "Our Common Future" (World Commission on Environment and Development 1987), the basis were settled to see environmental problems and global situation from a political perspective (Bolin 2007). The heads of the World Meteorological Organisations and the United Nations Environmental Program governing council established the so-called Intergovernmental Panel on Climate Change (IPCC) holding the first meeting on 1988. From that moment, IPCC has been in charge of validating and presenting scientific facts about climate change and policy responses to the matter.

The last climate change report was released on 2014 and assessed the scientific knowledge on the matter since 2007. Human influence on the climate system is now clear and current anthropogenic emissions of greenhouse gasses are the highest in history (IPCC 2014b). The leading cause of climate change is anthropogenic greenhouse gases emission from fossil fuel combustion (from 1979 until 2010 accounted for 78% of the total emissions). Anthropogenic greenhouse gasses are driven by population size, economic activity, lifestyle and energy consumption, land use patterns, and climate policy (Rosenzweig and Neofotis 2013) and others such as the cooling effect of aerosols. Observations of changes in the ocean surface also provide evidence for a shift in the global water cycle. Data demonstrate that there is a relationship between cumulative CO_2 emissions and projected global temperature change to the year 2100 (IPCC 2013a).

1.6 Impacts and projected effects of climate change

The impact of climate change are felt by both natural and human systems. The future climate depends as much on natural climate variability as on the future human- induced emissions. Impacts on natural systems are seen in changes in the water cycle altering water resources both in quantity and quality. There is *very high confidence*[1] that the Arctic sea ice extent decreased over the period 1979–2012. The rate of the annual reduction of ice extent was *90-100%*, which is 3.5% and 4.1% per decade since 1979 to present. Current glacier extents are out of balance with current climatic conditions. According to the IPCC (2014a), the glaciers will continue to shrink in the future even without a further temperature raise. Also, the changing sea level is one of the consequences of the changing climate. The results obtained in the latest estimate show that global mean sea level has risen by 0.19 m, over the period 1901–2010. This may be due to global glacier contribution along with ocean thermal expansion and the warming of the ocean (IPCC 2012, 2014c). Global-scale precipitation is projected to increase gradually in the 21st century, but changes in precipitation will not be uniform. In subtropical regions, mean precipitation will *likely* decrease whereas, in wet regions and high latitudes, it will *likely* increase.

Also, there will be more frequent hot and fewer cold days. It has been observed that the strongest warming is located in the highest northern latitude of the planet (Feulner et al. 2013). Nine out of the ten warmest years in the modern meteorological record have occurred since the year 2000, being the year 2012 the ninth warmest since 1880. The difference between global temperatures during an Ice Age and an ice-free period is only about 5ºC. Also, the temperature of the global surface temperatures, have increased (Brohan et al. 2006) and remain in an ascendant trend (Hansen et al. 2013). It is projected that average global temperatures may increase by 1.4-5.8ºC by the end of the 21st century.

Many changes in extremes have also been observed; it is very *likely* that human influence has increased the probability of heat waves and hot days in some locations (Oppenheimer et al. 2014). On the global scale between 1951 and 2010 The number of cold days and nights decreased and the number of warm days and nights increased (Folland 1999). It is *likely* that heat wave frequency has increased over this period in large parts of Europe, Asia,

[1]The confidence levels on the IPCC Fifth Assessment Report are based on the evidence (robust, medium and limited) and the degree of scientific agreement (high, medium and low). They combined evidence and agreement results in five levels of confidence (very high, high, medium, low and very low).

and Australia. Despite the fact that regional trends may differ, since 1950 it has been detected a trend of increase in heavier precipitation events in many regions.

Many species are and will be facing extinction risks (IUCN 2012). Coral reefs, polar ecosystems, and coastal systems are at risk from sea level rise. Not only terrestrial and freshwater species face an increase of extinction risks and possible declines in species richness but also ecosystems services are expected to be affected (Midgley 2012). Likewise, the potential for disruption of ecosystems functionality as a result of climate change is translated into a critical likelihood of loss of ecosystems services. These contribute to a larger magnitude risks to human systems for example to water purification, removal and sequestration of carbon dioxide by forests, coastal protection by mangroves and coral reefs) (IPCC 2014c).

Human systems are impacted by climate change too. Climate change is projected to affect various aspects of people's life both directly and indirectly. Food production and security, livelihoods, health or economics, are domains clearly transformed by climate change (Carter 2010, Oppenheimer et al. 2014). Air pollution and extreme events will have a strong impact on climate-related sectors: water, agriculture, food security, forestry, health. Many households and essential services for people in rural areas and the most vulnerable groups in urban and marginal urban areas, will be affected over the coming years by the weather adverse effects (Foa 2009, WHO 2011).

Regional impacts on ecosystems, food security and agricultural systems will greatly impact less-developed areas. There, people will suffer major impacts on water availability and supply, food security and agricultural incomes. For instance, climate change impacts on crop productions may influence food prices. If climate change reduces crop yields, food prices and the number of food-unsafe people are expected to increase globally. Rural population in low-lying coastal zones are expected to suffer from the risk of disrupted livelihoods due to storm and coastal flooding. There is high risk for communities whose livelihoods depend on provisioning services such as food or regulating and cultural services. Farmers will be particularly affected by food insecurity connected to warming, drought, flooding extremes. This group of people is also vulnerable to malnutrition and diseases (IPCC 2014c).

In the health domain, human systems will be affected by exacerbating existing health problems (IPCC 2014b). Climate change is projected to alter the prevalence and distribution of diseases worsening health conditions through increased production of ground-level ozone and smoke (D'Amato 2011). As a result of changing rainfall patterns

and the rise in extreme temperatures an emergent public risk is malnutrition and interference in food production. In urban areas, new risks and respiratory diseases emerge from the interaction of exposure to extreme heat and degraded air quality.

Human systems can also be impacted by the risk of human displacements particularly in development countries and rural areas, where the lack of resources for planned migration leave people to be in higher exposure to extreme weather events (Foresight 2011). Disasters associated with climate change are influencing population mobility patterns making some marginal areas exposed to pressures of social and environmental considerations (UNEP 2012b, World Bank Group 2014). This will impact both the receiving and sending communities of people, generating an increase in displaced for environmental reasons and increasing vulnerability (UNEP, 2012).

Climate change impacts may have consequences beyond the regions in which they occur. In many cases both, mitigation and adaptation strategies have unintentional costs beyond locations (Oppenheimer 2012). As described above climate change is projected not only to amplify existing risk but also to create new ones resulting from the interaction of climate change-related hazards and vulnerability of societies or communities (IPCC 2014b).

1.7 Changing climate in Latin America

This section presents the current and projected impacts of climate change in Colombia and Mexico. First it gives an overview of climate change effects and projected impact for the Latinamerican region, then the specifics of both countries. Longitudinal scientific data on climate change does not exist both at the global and local level for each of the thesis study area (Magrin et al. 2014). However, the evidence that both countries are feeling climate change is clear.

Latin America and the Caribbean are expected to feel the effects of climate change (Figure1-1). Changes at the extremes and decadal variability have affected large parts of the population in the region. Many of these changes result from climate variability, but human actions induce others.

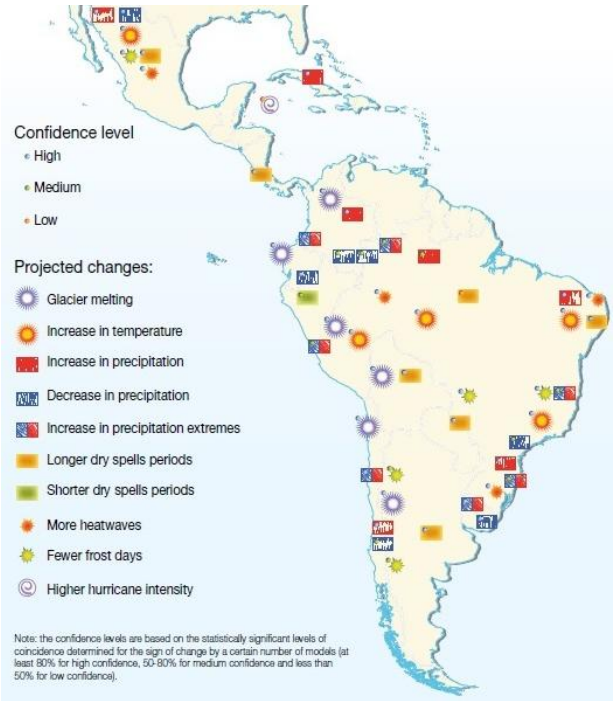
In the region the pattern in extreme climate events indicates a relation between greenhouse gas emissions, temperature rises, increased intensity of hurricanes and sea level rise (IPCC 2007). Latin America has seen a rise in extreme climatic events and with it an increase in the number of affected people (IPCC 2014a, World Bank Group 2014). For instance, between 2000 and 2009 the number of storms increased by 12 compared to the period between 1970 and 1979. In this same period, floods multiplied. In the last decade, the number of people affected by extreme temperatures, forest fires, droughts, storms, and

floods reached more than 40 million. This can be due to the increased human settlement and vulnerability of coastal zones (López Izquierdo 2010).

Climate forecasts for Latin America and the Caribbean show that temperature rises will vary. Towards the end of the century temperature will vary within a range of 1° C to 6° C regardless of the climate model used. A decrease in precipitation is also projected up to 40% and an increase of rains up to 10% (Galindo et al. 2010, IPCC 2014a). Concerning changes in sea levels are expected to be much greater than the 5 cm world average expected. To some extent the sea level rise is associated, with the melting of glaciers. As an example, in Colombia the snow-capped volcano of Santa Isabel showed a 44% decrease in its ice-covered peak (CAN et al. 2007).

Projected regional climate change patterns show that Central America and Caribbean sub-regions will experience an increase in the intensity of hurricanes. Mexico is projected to have higher temperatures, a bigger number of heat waves, fewer frost days and increased number of droughts (Sillmann et al. 2014). In Peru, Chile, Colombia, Ecuador, Bolivia, and Argentina, glaciers will continue to shrink, and countries with coasts on the Pacific and Atlantic Oceans will experience increased precipitation (Poveda and Pineda 2009, Marzeion et al. 2012).

Figure1-1 Climate patterns projections for Latin America and the Caribbean for 2100



Source: *López Izquierdo, 2010*

By 2050, there will be pressures on ecosystem services in south-eastern Brazil, the Andes and Mexico, and in the Central American and Caribbean sub-regions. Also, fisheries in the Pacific coastal areas of Peru and Chile will be adversely affected. The decrease in precipitation will have adverse effects on agricultural yields in several regions and countries on the continent (IPCC 2014a). Urban areas in the region will experience different risk levels as a result of cyclones, floods, and droughts. The cities of Central America, the Caribbean and Mexico, those in central and western Colombia and the coast areas of eastern Argentina and Brazil are at the highest risk. Latin America and the Caribbean is the worldwide region with the greatest biological diversity. The region hosts unique ecosystems. This coupled with the uneven economic and social conditions in the region, makes the area particularly prone to climate change effects. Moreover, in the area six countries are considered megadiverse (ICSU-LAC 2010). Biodiversity is essential to human well-being, in view that it supports a broad range of services on which human societies depend on (Midgley 2012). Climate change is driving force of biodiversity loss in the area. Inland, marine and coastal ecosystem and genetic diversity are vulnerable to climate change (UNEP 2012c). Also, for many species, the threat is primarily that of climate change (UNEP 2010). Variations in climate will alter flora and fauna species, giving rise to a disturbance in food chains and reproductive patterns (Myers et al. 2000, Sukhdev et al. 2010).

Climate change will bring shifts to environmental and human conditions in different places and times across the region. Hence, the region has to be prepared not only to deal with the consequences of climate change but to reduce their vulnerability (Magrin et al. 2014).

1.7.1 Changing climate in Colombia

Colombia is projected to be one of the most affected countries by climate change (Arbeláez-Cortés 2013, IPCC 2014c). Currently, most of the disasters in Colombia are due to climate variations. Intensive droughts and frosts threat the richness in biodiversity in the Amazonia, Pacific, and Andean region. Air temperatures have changed in Colombia having increased in one degree in the past 20 years (Poveda and Pineda 2009).

Effects of climate change are seen on water resources. The rise in rainfall is now common in Northern Colombia (Campbell et al. 2011). According to estimates of IPCC (IPCC 2014a) for the period 2070-2100, in some Colombian inter-Andean and Caribbean regions reductions in the annual amount of rainfall will be greater than 30%. However, the eastern foothills of the Cordillera Oriental (Marengo et al. 2011) and Pacific region would

experience an increase (MAVDT 2010). The middle Cauca and high Nechí will present rainfall reductions greater than 30% (MAVDT 2010).

Colombian rivers such as the Cauca, are exhibiting a decreasing trend. Due to the rapid retreat and melting, tropical Andes glaciers are projected to disappear (IPCC 2014a). Since 1850 glacier melting caps have already diminished 80%, with losses of 5% in the last three decades (IDEAM 2010).

The impacts of climate and natural changes are also felt in the human system. Colombian floods are causing death and displacement, and climatic patterns are already affecting (Hoyos et al. 2013). As the results of the increase in rainfall Ii 2010, the Colombian government counted more than two million people affected and an emergencies for floods and landslides (García et al. 2011). In the same year, fishers experienced an extreme flood event that harmed their houses closed to the river Cauca (Rodriguez Cárdenas 2011). Intensive droughts and frosts threat the richness in biodiversity in the Amazonia, Pacific, and Andean region.

Economic and food systems will be affected too. A good example of economic losses associated with climatic events is given by the phenomenon "La Niña" 2010-2011 in which national parks were affected. Climate change is projected to affect the primary sector. Due to flooding losses in livestock activities, poultry, aquaculture and infrastructure were experienced too. La Niña involved the spread of respiratory infections (DNPT 2012). Colombia is one of the eight most vulnerable countries to climate change impacts on fisheries (Allison et al. 2009). The expansion of the agricultural frontier has affected Colombia where activities such as deforestation, agriculture, cattle ranching, and gold mining are causing environmental degradation (ECLAC 2010). By 2050 all main crops are expected to be affected by observed and projected warming, around 80% of them have already been impacted in more than 60% of cultivated areas (Ramirez-Villegas et al. 2012).

Colombia and its people are highly vulnerable to the effects of climate change. The Government has designed a plan for adapting to climate change and adjusted to local needs and peculiarities. This strategy is linked to the engagement of other actors and territorial sector, private entities, NGOs and the population itself (DNPT 2010).

1.7.2 Changing climate in Mexico

As for the case of Colombia, Mexico is following the same trend of projected impacts of climate change. The temperature increase in the twentieth-century has caused alterations in plants and animals in Eastern Mexico (IPCC 2014a, World Bank Group 2014). Observed decreases in the hot extremes have accompanied the increase in frost days (IPCC 2014a).

Observations also show an increase in heavy precipitations but also dryness over the country (DeGaetano 2009). Much of Mexican territory exhibits decrease in annual mean and winter precipitation with the expansion of arid subtropical regions (Seager and Vecchi 2010). It is projected an increment in the occurrence of extremely dried summer seasons. Water resources are projected to be at risk. The area already lacks water supplies stressed by non-climatic factors such as population pressure (Martínez-Austria and Patiño-Gómez 2012). In quantity terms, water already exceeds stressful levels and the quality has diminished reaching a high percentage of polluted water (CONAGUA 2010). CONAGUA (2010) projects that water shortages together with an increase in water demands will lead to groundwater over-exploitation.

Wildfires can be both natural and human processes. Some human practices such as slash-and-burn agriculture can have negative impacts in Mexican forests. Yet, wildfires in Mexico have been related to long and warm springs and summer drought (IPCC 2014a). Since the early 2000s, forest dieback has been associated with drought and high summertime temperatures. Also the areas burned in the continent boreal forest, and northwest and central Mexico correlate with the dynamics of season land temperature variability. This makes Mexican forest and ecosystems extremely vulnerable, changing the forest structure and regional distribution and leading to forest infestation (Prieto-González et al. 2011). Warning trends and changes in ecosystems are already affecting the area. The distribution of these changes is consistent with climate change that interacts with other environmental changes such as land use change.

Mexico is one of the five countries in the world projected to experience the highest increase poverty due to climate-induce extreme events (Ahmed et al. 2009). The country is expected to suffer from extreme events such as hurricanes, droughts, and floods (ENCC 2013). It has been observed that migration rate from rural Mexico is positively associated with natural disaster (Saldaña-Zorrilla and Sandberg 2009). As these extremes raise, the number of displaced population will increase as well. Desertification along with the projected precipitation decline up to 30% can compromise agricultural activities. As a result of heavy precipitations and the rise in flooding agriculture and livestock sectors in Southern tropical Mexico can be affected (Lankao 2010, IPCC 2014a). The shift in agricultural productivity could aggravate rural poverty in the country leading to migration towards urban areas. Mexican communities are considered highly vulnerable to health and diseases. Changes in temperature can influence the risk of water-borne disease like cholera, which remains important in Mexico (Monterroso et al. 2012).

In 2013, the Mexican government published the National Climate Change Strategy (ENCC), integrated by the national policy on climate change, adaptation to climate change effects and low carbon development and mitigation. This is a long-term strategy that establishes national priorities and defines criteria for identifying regional priorities.

1.8 Mitigating and Adapting to climate change

Mitigation has been the most common policy response since the evidence for human interference with the planet climate balance started to emerge. Mitigation has been addressed either reducing emissions of greenhousegases into the atmosphere or enhancing the ability of the earth to absorb carbon (carbon capture and storage) (IPCC 2014d, Barbier 2014). Other options refer to climate geoengineering attempts to manipulate climate to counteract or halt the effects of climate change (Robock 2015).

Two central approaches can be used to lessening GHG emissions depending on either the demand-side or the supply-side. The demand-side implies changing people behaviour or technologies so that people used less fossil fuel. The supply-side implies exploit new sources of energy to reduce reliance on fossil fuels. It is easy to assume that energy efficiency is mostly about technology. However, a series of political decisions (Rickards et al. 2014) and cultural factors figure in whether people can or cannot create efficient technologies (Gifford 2011). Also whether people chose to use them or not over time. In other words, energy efficiency is both technologically and deeply human (Jones and Clark 2013). All of the conservation options require changes in the traditional patterns of behaviours and even rethinking in core values.

However, it is politically unpalatable to suggest that society will be unable to address sufficiently the climate change balance (World Bank 2010, World Bank Group 2014). As a result, adaptation has been viewed for some as an admission that society failed or will fail to solve the problem of human contribution to climate change.

Some degree of climate change is inevitable (IPCC 2013b). This implying that people need to be prepared and protect communities and ecosystems, from the impacts of climate change (IPCC 2014d). Adaptation strategies are targeted to protecting ecosystems, addressing underlying causes of vulnerability, protecting people from impacts, and learning more about the causes and effects of climate change (Biagini et al. 2014). Adaptation is local in focus because it helps to reduce vulnerability and enhance resilience (Bassett and Fogelman 2013), and it is best implemented if integrated into programmes like city planning or ecological conservation (Burch and Harris 2013). Some adaptation strategies are familiar to human; this is the case of communities in rural areas and indigenous people

(Leonard et al. 2013, Nkomwa et al. 2014). These strategies encompass crop diversification, irrigation, water management and are common in agrarian societies. More recently societies have developed reactive adaptation practices such as disaster risk management (Butler and Pidgeon 2011) that help communities recover from and prepare them for extreme weather events or insurance systems. The so-called proactive adaptation (Philander 2008) is the ultimate goal of climate change research, and it is more complicated because it requires understanding the impacts of climate change and this is relatively new. Society can be prepared for future scenarios through flood defences, refugee support or city planning. However, also adaptive responses can be addressed by individual behavioural responses. The complexity of human behaviour and governance is one of the biggest question marks in future scenarios (Adger et al. 2013).

Adaptation requires significance advances in understanding more about drivers and impacts of climate change (Philander 2008, Bassett and Fogelman 2013). More voices coming from a participatory process are needed at the table to construct robust and valuable scenarios of impacts and adaptation (Hoogstra-Klein et al. 2012). This allows the sharing of traditional knowledge about the ecosystem and allows different groups to voice their views about what a desirable future might look (Eakin et al. 2007, Forrester et al. 2015).

1.8.1 Vulnerability: the challenge of mitigation and adaptation

Strategies to mitigate climate change have to be reconciled with adaptation strategies (Pielke Jr. 2005); adaptation strategies allow creating the basis to mitigate future impacts of climate change. Adaptation is certainly needed at all scales to complement the efforts of mitigating climate change. In the debate between adapting or mitigating climate change, the focus is maintained on the notion of vulnerability (Malone and Engle 2011). There are several definitions of vulnerability that have been adopted in the literature. For the IPCC (2014e) vulnerability is *the degree to which geophysical, biological and socio-economic systems are susceptible to and unable to cope with, adverse impacts of climate change including climate variability and extremes*. This definition is remarkable in two ways. First it recognizes the ability of a system to cope with environmental changes; second, it recognizes the social dimension.

Causes and consequences of climate change are intervened with global patterns and vulnerability. The vulnerability cannot be measured directly, and it applies differently in each context. Vulnerability -social vulnerability- is the consequence of past events, but it makes sense to the future (Beck 2007). As for climate change and adaptation strategies, vulnerability corresponds to the peculiarities of each human and natural system, hence

differing for each circumstance and time. Climate change vulnerability can be manifested in a lack of access to water, agriculture, and fisheries. Also, it affects human settlements, their energy or water resources and access to them, and basic health services. A greater or lesser degree of vulnerability of these systems will vary depending on geographic location, time, and space, social, economic and environmental. Sociodemographic (age, race, gender) and socio-economic factors (lack of information, socioeconomic status) determine a greater or lesser degree of vulnerability (WHO World Health Organisation, 2011). The IPCC states that the level of exposure, sensitivity, and adaptability determines the vulnerability to potential impacts of climate change. Moreover, climate change can foster vulnerability. The presence of people, livelihoods, environmental services, and resources to places that may be affected by adverse climatic events (that is the exposure level) is a significant cause of losses by climatic and environmental disasters. To reduce the likelihood and the magnitude of harmful outcomes resulting from climate change, the ability or potential of a system to respond successfully to climate variability (adaptive capacity) is necessary for the design and implementation of effective adaptation strategies so as (Smit & Wandel, 2006). Consequently, to detect the capabilities of human systems to increase and keep the quality of life, it is essential to focus on socio-economic and institutional factors determining the adaptive capacity, the level of exposure and sensitivity (Preston 2009).

Assessing vulnerability at a local scale is looked-for. Vulnerability assessments need indicators and also stakeholder participation (Malone and Engle 2011). Stakeholder feedbacks and local knowledge are useful for identifying specificities in each context and also what people are vulnerable to and increase resilience (Dodman and Mitlin 2013, Forsyth 2013). Defining vulnerability from the stakeholder perspective means that community exposures should be discovered by themselves (UNFCC 2011).

Climate change besets existing arrangements for livelihoods, water sharing, especially in communities in developing countries and reliant on natural resources (IPCC 2012). For communities highly exposed and vulnerable the most dramatic climate events can have fatal impacts (IPCC 2012). Sometimes communities are not able to effectively adapt to climate change and many of the resources are seen endangered (Jacob et al. 2010) Interestingly, some others have successfully dealt with climate change and environmental threats by applying their knowledge or by using land model that are resilient to climate changes (Salick et al. 2005, Salick and Ross 2009). For example communities in the Pacific Islands or the Himalaya (Campbell 2006).

Therefore, analysing the social dimension of climate change is as necessary as comprehending the scientific and physical aspect of the issue. Many of the people's and communities abilities to cope with climate change may remain uncovered without a thorough analysis of how communities define, understand their experiences and identity. Different people may give different ways of interpreting risk and policies. Climate change is going to be felt locally and because policies are to be implemented locally cultural and political factors are critical for understanding how people respond or could respond to climate change risks, and how their capacity can be translated into effective collective action. .

Chapter 2

THE SOCIAL CONSTRUCTION OF CLIMATE CHANGE RISK

In light of the research objective, the theoretical framework for the study is built on two questions. First, how risk is understood and perceived in contemporary society. Second, how the environmental attitudes and the cultural context explain people's reaction to climate change.

Five sections comprise this chapter. The first one refers to how contemporary risk is understood. This is followed by a section on how climate change meaning is socially constructed. Thirdly, an approximation to climate change risk perception and theories on the matter are presented. The two last sections gather information on environmental attitudes and behaviours and barriers preventing people to perceive, hence to adapt and mitigate climate change.

2.1 Risk in the late-modernity

Risk refers to a situation or activity that may lead to uncertain adverse outcomes affecting something that is valued by humans (Steg et al. 2013). The concept of risk can have different meanings. Risk, though real, involves human evaluation, so the concept is mainly socially constructed (Slovic 1987). On the one hand risk is objective; it exists regardless of people's concerns about the source of knowledge and its consequences (Rundmo and Ullerbeg 1996). On the other hand, risk depends on those who perceive it (subjective) depending on people's ability to perceive threats and dangers. Luhmann (1993) agrees that hazards only become a risk when they come into public consciousness. This is due to the subjective side of risk that makes it difficult to classify into watertight compartments.

As Ekberg (2007) acknowledges, the scientific community lacks a proper definition of risk, which could lead to diffusion or denial of human responsibility. This statement determines some issues for discussion (concerning governance and use of knowledge among other factors). Mary Douglas (1992) considers that hazards are pre-existing to any state of risk and risk is a value judgment of human perception. In general, risk indicates the scale of something to happen along with the magnitude of associated losses (Douglas 1992).

Society has always interacted with danger, risk, and uncertainty finding strategies for overcoming these situations (Lupton 1999). Risk has always been part of the human and natural systems. However, nowadays, natural risk shares space with new risks unique to the process of *modernity, post-modernity or late modernity*[2]. However, the human-risk relationship has qualitatively changed in the last decades (Beck 1992a, Lupton 1999). Society reached the turning point when it started thinking about the effects of human actions in nature rather than the effect of nature on humans. As society progresses in science and technology, new risks come forward, giving rise to a new model of society coined *risk society* (Beck 1992b).

[2] The concept of Modernity is related to the Industrial revolution and refers to a period marked by rejection of traditions, and the claim for individualism and freedom, faith in the progress, secularization and the emergence of the Nation State. It incorporated rationalism into public sphere. Post-modernity can be understood in the context of globalization where societies continue with the process of modern institutional transitions and cultural developments (Scott and Marshall 2009).Post-modernity refers to social and political innovation since the 1950s in Western societies. It has also be termed as risk society (Beck 1992a), late-modernity (Giddens 1990) or liquid modernity (Bauman 1999). The term liquid modernity explains the position of the individual in society being a continuation of the process of modernity initiated by the end of 18th century. In the risk society, late-modernity or liquid modernity, people have increased feelings of uncertainty and conflicting feelings and beliefs; people can shift from one social position to another in a "liquid" manner.

Beck (1992a, 2000) and Giddens (1988, 1990) consider that risk is different now. The traditional natural risk (over which there is little control) has given way to technological risk (manufactured through science and technology) (Giddens 1988). In the risk society, predictable/traditional risks are now uncontrollable, and social institutions no longer cover dangers and threats (Giddens 1990, Beck 1992b). Risk is not a danger itself, but an anticipation of what could turn into a catastrophe. Risk exists inherently in the future: an event yet to be determined. Catastrophe, conversely, may be determined in the present. Unlike in traditional societies, the current risk is human influenced (Beck 2007). On the other hand, since individuals are now isolated from traditions, their decisions are no longer group but self-oriented, and this may also be applicable in the case of climate change.

Risk society is characterised by threats to self-identity. In industrial modernity, traditions, predictability, and safety grounded society while the risk society generates isolation, fragmentation and uncertainty. Ekberg (2007) elucidates differences in: i) the change from natural to technological risk, ii) the changing focus on risk towards a more constructivist perspective, and iii) new distributions of risk giving way to what she calls "borderless risk". Current risk is neither temporally, spatially, nor socially limited. Beck (2000) accounts that the point of origin of a risk may not be the point of impact. This situation gives rise to the so-called side-effects regions and causes regions (Beck 2007). Therefore in a global scenario, environmental risks are locally originated but globally expanded (Beck 2007). New risks are delocalized, incalculable and non-compensable (how is it possible to compensate when the existence of risk is not proven?).

When concerning natural disasters and extremes, these aspects limit response and adaptive capacity remarkably. A new outlook is needed for understanding the complexity of this new society, an approach able to address risks where people share the world without segregating others, and are required to include cultural others. This cosmopolitan alternative (Beck 2000) grasps new dynamics and danger trespassing the line of the nation-state and including a global view on risk.

Society has now reinvented itself around risk, creating new ways of organising to confront vulnerability. Knowledge and science are core elements for managing risk in a risk society. Risk requires adjustments in using new information as new knowledge is available. Failure to cover and manage risk may turn risk into catastrophe and danger. This means that people need a process of reflexivity and flexibility to respond to uncertainty and risk. Sometimes knowledge substitutes traditions in adaptive responses to risk (Giddens 1990) and people make great efforts in replacing their traditional sources of trust. In the *risk*

society, decisions are made not only by democratic actors but influenced by those not democratically elected (those possessing knowledge): scientists. Here, legitimacy is acquired based on abstract codes and professional accreditation. The sequence society-trust- science is evident as well in the decision-making process. The role played by scientists is increasingly important, even though they are not elected by public consultation or democratic means. Sometimes the lack of consensus among experts has resulted in science distrust; this is why knowledge and science have to be legitimate and salient (Cash et al. 2003a).

In the risk society, climate change is framed as a new risk. Climate change is uncontrollable, and traditions are not always valid to cope with this new threat. Society needs to reinvent itself to deal with climate change and reduce vulnerability.

2.1.1 The environmental risk in the risk society

In the risk society, natural risk has become "scientified". Hence, the distinction between environmental risk and technological risk is now blurred (Beck 2007). Considering Rundmo and Ullerbeg (1996), environmental risk is both objective and subjective. It exists regardless of human intervention, and the magnitude of danger depends on how people perceive and understand risk itself.

Environmental and climate change risk include large-scale environmental processes with potentially negative consequences (Böhm and Pfister 2005). Human activities can cause environmental damage, and environmental changes can cause adverse effects on humans. Environmental risk frequently encompasses both risks for and from the environment, are complex and uncertain, often emerging from aggregated behaviours of individuals, and sometimes considered anthropogenic. Environmental hazards are constructed on latent consequences; there is no certainty of whether they will happen or not (Beck 1992a, 2007). Global changes, in particular, may have negative consequences that are often extremely delayed and geographically far-reaching (Pawlik 1991). The latent consequences and the slowness of risk consequences often generate in society a cultural blindness that hinders action.

Since the natural environment provides important resources for humans, environmental damage can have dangerous consequences for human living conditions (Böhm and Pfister 2000). Steg and Vlek (2009b) has pointed out that environmental risks constitute a kind of social dilemma situation: the option that is individually rational in the short run turns out to be collectively disastrous in the long term. Due to the aggregated causation of many environmental risks, there is little opportunity for an individual to control or prevent

potential damage (low controllability). Solutions for environmental risks often hinge on ethical or moral considerations (Pawlik 1991). Morally, the best choice is not necessarily the one with the best consequences, but one that states some deontological rule. Such rules often touch upon ethical considerations such as justice and equity that are subject to subjective opinions and in a way personally constructed.

2.2 The social construction of climate change risk

Progress in research and interest in delving into aspects focused on "agency" of climate change have proposed new issues of importance to the study of climate change and its effects. Knowledge, perception and power relations are concepts that have been incorporated into the social climate change research and relate to the study of risk perception and behaviour changes.

As previously mentioned, if the risk can be somewhat independent to who observes it, there would be no opinions on which situation may pose a danger. The fact is that climate change is subject to interpretation. Climate change meanings and consequences have been built up, interpreted and reinterpreted socially. Otherwise, how would it be possible for the same data to be interpreted differently (Cass and Pettenger 2007).

To better comprehend climate change risk in the context of late modernity and the risk society, an outlook is needed to deepen as much as possible into the social construction and dimensions of the issue. That is why the "construction" approach provides a framework for analysing how and who creates the knowledge and science that opens the door to the study of risk perception. It allows exploring the side of risk based on a personal assessment. The debated character of climate change knowledge gives rise to uncertainty and scepticism. What is interesting about climate change is that people keen on the issue do not necessarily need to agree. Two groups compete and are mutually exclusive when talking about climate change: those who are believers and those who negate the belief.

The study of how society constructs climate change risks needs a theory allowing the incorporation of human elements to the practices surrounding the perception and the social dimension of climate change. These theories are those from the constructivist approach such as social constructivism and social constructionism (theories that emerged from the postmodernity period).

Social constructivism was first coined by Berger and Luckmann (1967) who introduced constructivism in sociological analysis with *The social construction of reality*. In this regard any classification of constructivist approaches includes, explicitly or implicitly, the existence of i) cognitive constructivism rooted in psychology, ii) constructivism of sociocultural

orientation (social constructivism, socio-constructivism or co-constructivism), and iii) constructivism linked to social constructionism of Berger and Luckmann and postmodern approaches in psychology that place the knowledge in the discursive practices (Potter 1996).

The constructivist approach and particularly the constructivism and social constructionism, are closely related to the way social facts and reality are created. Both are opposed to the modernist idea that reality is mainly objective and draw attention to the importance of knowledge as the key for understanding and "creating" reality. Both approaches are of help for understanding how individuals construe reality, considering the psychological and the social contextual approaches.

They share ideas about how knowing is a psychological and social process that generates facts. What is essential within social constructionism is that what is socially constructed could be built differently. That is to say, it is possible to think differently, and this would make the constructions that depend on the thinking different from itself (Elder-Vass 2012). Consequently, that process can influence human behaviour.

Hence how can the reality of climate change be objectively real? For an object to be seen as a risk, first it must be built as such (Hiltgarner 1992). Humans give meaning and shape their reality through knowledge, culture, language and experience (Berger and Luckmann 1967, Foucault 1997, Elder-Vass 2012). Therefore, under the constructivist approach, climate change will be individually and socially constructed through the knowledge people have, the cultural contexts, and the language used when referring to it, and the "experience" people might have had with consequences of climate change.

For the constructivist approach, the personal world is founded according to routines that apply to particular circumstances or adverse situations. The reality of everyday life is organized *here* and *now* (Berger and Luckmann, 1967). In the case of climate change, this is difficult as it requires a significant abstraction because consequences are latent and future, as are many other environmental risks. In the construction of social reality, the individual develops and socializes considering its closest context through processes of learning and interaction. In general, humans have a very precise and specific knowledge about what is happening elsewhere (Berger and Luckmann, 1967). According to this, people not directly affected by climate change will experience difficulties to interiorize negative consequences. Such is the case of climate change, and perception of climate change. There is a subjective reality that emerges from the thinking of people who do not see consequences as something real and happening (latent consequences). This serves to introduce one of the

greatest problems about the risk posed by climate change: the remoteness and psychological distances that exist with climate change (Spence et al. 2012). Thus a problem arises in objectifying the reality of climate change, as the individual distance themselves from climate change (as in many cases the issue is perceived as remote and unlikely). The idea of the *here* and *now* opens the doors to raise awareness on how facts from far and distant locations can be seen as potential threats. Particularly, some lines within social constructionism state that there is nothing from the world or the reality independent of our talking or writing (Potter 1996). Language provides a tool to shape meanings, hence determining the manner people do it. Discourse can also shape the world, as far as it is related to the content of the communication (Foucault 1972). Our experiences in discursive interaction as well as the normative environment influence our dispositions and some facets of the subjectivity (perception).

Another line within social constructionism argues that reality is accessible only through knowledge; knowledge understood as a socially constructed set of beliefs. Knowledge can be thought and influenced by the external world. Indeed, social constructionism argues that the way people collectively think about the world in itself constitutes a change of significance for the social worlds. Social constructionism refers to the creation of knowledge as a social process, whereas for constructivism knowledge is created through individual experience. For constructivism, pre-existing knowledge gives rise to new knowledge. Each new knowledge or information is stored with previous experiences because learning is an active and iterative process constantly modified with experience. For social constructionism, individual phenomena are socially constructed and gives meaning to reality from the relation with peers (Agudelo Bedoya and Estrada Arango 2012, Elder-Vass 2012). New knowledge is needed to create a certain type of idea of reality. Basic, everyday knowledge derives from and is kept through social interactions and it is negotiated by people. Meanings and social institutions are filed as part of an objective reality. When people interact, the perception of reality is reinforced because they act upon this common understanding. This is how social reality is created. In the field of climate change, understanding and learning from repeating personal experiences involves affective and associative processes that prove to be more efficient than information processed by statistical results (Weber 2010). This is based on people trusting other people. Input from social constructionism, as it stands the influence of social context to build social reality, is of greater relevance to the thesis.

Next to the understanding of the processes of social interaction, information received by people is crucial to modifying behaviours. For climate change, information received is also crucial: the way consequences are shown and understood is thanks to a top-down approach where scientist and knowledge are absolutely needed. In considering climate change as a social reality, the creation of knowledge is crucial. The source of knowledge and interpretation may vary depending on the agent and the observer; this could give rise to scepticism and denial of climate change.

Society is accustomed to receiving information and defines what is meant by risk based on information received from expert knowledge. It is the individual who independently lost ground to the expert, relying on the new source of information (Beck 1992a, 1992b). The classical structures that so far have influenced the perception of risk have been "displaced" by others that emerge from the process of modernity (Bauman 1991): information and communication. The positioning within new structures of modernity (access to information, management and understanding of it) will determine why some people objectify facts as risk more easily than others. In this sense, the agency takes importance, but within a particular cultural framework. It is the space where risk emerges that is linked to the socio-cultural context. It has been found that the credibility that citizens attribute to the source of risk is not attributed only to the "experts" but also to "intermediate groups" (being those having knowledge of the object of risk at the expert level, and also directly interacting with the risk object) (Poumadére and Mays 2003). Scientific knowledge is likewise constructed through social processes where the personal assessment is important.

In an attempt to conjugate influences of every dimension of social constructionism, Elder-Vass (2012) consider that people are indeed agentic subjects, but when they make decisions these are influenced by beliefs and knowledge of past experiences. The autonomy of individuals exists regardless of social forces. However, agency capacity is the outcome of social interactions. The sense of autonomy is not a mistaken belief, but context and experiences shape people's reality as well. Putting this into terms of climate change: for social constructionism the reality of climate change emerges not only from individual processes such as language, for instance, but also from shared contexts, culture, and knowledge; for constructivism, experience will be needed to understand and create the reality of climate change. Hence, an individual who has not experienced the consequences of climate change will not be able to create the reality of risk for climate change. Incorporating the constructivist perspective into the analysis means recognizing a set of joint obligations and the acceptance of social responsibility towards climate change.

2.2.1 Effective knowledge and science for climate change

Societies are increasingly growing concerned about environmental threats and particularly climate change. However, many of the inherent characteristics of these challenges remain uncertain (McKibbin and Wilcoxen 2009, Morton et al. 2011). According to social constructivism and its psychological implication, understanding of common knowledge reinforces reality and language may determine the way people construe and perceive their reality.

As stated a proper use of language allows the objectification of subjective meanings. An adequate use of language and terms are important to influence the construction and perception of climate change. Ungar (2000) identified that there is a misunderstanding and a misuse of concepts by the general public that lead to a bad approach to climate issues. For example, there is confusion between climate change and global warming, and also the assimilation of other environmental problems such as ozone depletion (Ungar 2000, Whitmarsh 2009).

It is, therefore, essential to link research to social concerns and be consistent with the audience so that they will "consume" information about climate change. There should be a shift in the way information is presented. It is not only a matter of informing but it is essential to communicate. It is adequate to change to a *reader-centric* approach (Liverani 2009) (how will climate change affect people's lives?), as well as the internalization of social meanings. A concerted effort should be made to display consequences of climate change in recognizable terms for the general public. Its implication and consequences in daily life and routines will act favourably to reduce scepticism among the general public. It has been demonstrated that information provision itself might not necessarily lead to environmental behaviours (Schultz and Zelezny 1999). Other informational strategies such as tailored information, the goal setting or the prompting have proved useful in encouraging and fostering environmental behaviours (Steg et al. 2013)

The role of science and knowledge is decisive in making people not only to perceive but also to understand how the risk could potentially impact and affect them. Knowledge can also foster sustainable behaviours. For knowledge to be useful, it has to be perceived by scientists, stakeholders, and decision-makers as salient, credible, and legitimate (Cash et al. 2003a, 2003b.). For the topic of this thesis, the relevant information must put on the table pertinent issues to stakeholders involved in climate issues. Information must also adapt to different scales and contexts, to potential users of the information, and make it available as a political response (Evans et al. 2003).

Credibility assumes that facts, beliefs, and opinions can be held and because of the quality of information this is worth to be used by others (Clark et al. 2007). Credibility, *per se,* is difficult to evaluate. Proving that information is credible means greater difficulty in areas where there is some disagreement and uncertainty such as climate change. The fact that climate change is occurring in a context of uncertainty generates distrust of society. In addition, other elements such as the predominance of Northern countries' scientific opinions and the use of conceptual frameworks tailored to their needs at the expense of developing countries, casts doubt on the credibility of climate change scientific knowledge (Agarwal and Narain 1991).

The legitimacy responds to the belief that the process by which scientific knowledge emerges is a fair process and takes into account the views of stakeholders (Cash and Clark 2001). Legitimacy and credibility go hand in hand. Legitimacy in the creation of knowledge on climate change requires the visions of those stakeholders traditionally not accounted. It can be achieved by adopting geographically balanced approaches when elaborating environmental assessments (Millenium Ecosystems Assessment (MA) 2005, IPCC 2014c).

Researchers in the field of environment and social sciences strive to build consciousness about the need to institute sustainable development and generate sustainable awareness. However, there is some difficulty in moving from the theoretical to real actions that could make people become aware of the issue of climate change. The need therefrom emerges for more focused practice and action research (van Kerkhoff and Lebel 2006). It is desirable to foster a sense of appropriation in the development of knowledge, for instance by promoting mechanisms for transparency and accountability, facilitating the participation of stakeholders in the formulation of the political agenda, built on the so-called boundary organisations (White et al. 2010), and creating knowledge networks (Lemos and Morehouse 2005, Dilling and Lemos 2011). To improve the shift from knowledge to action, it is necessary to foster the integration of the local and the global by promoting the participation of all actors involved in research (Jenkins-Smith and Sabatier 1999). This is not an easy task, because in the field of climate change and the environment, there are a multiplicity of actors and sources of information, leading to problems of interaction and perception of the importance of the climate issue. Sometimes scientists and policymakers have different opinions on beneficial knowledge and how to make good use of it.

To make an effective shift from knowledge to action, the way in which researchers currently relate to policy makers needs to be improved (Finger 1994). It is wise to delve into the established relationship between scientists and policymakers. Understanding the

interactions between these two actors is the basis for creating a reliable knowledge base and for making proper use of information. It allows passing the knowledge to action (Jacobs et al. 2010). Broadly, this relationship is a dynamic and iterative process that allows policymakers to reduce efforts, achieve goals, and understand information to choose what best suits their needs. At the same time, policymakers have to recognize the contents and limitations of the scientific knowledge available. Hence, co-production of knowledge is required, and both scientists and potential users of information could lay the ground for the scientific agenda (Dilling and Lemos 2011).

The establishment of useful knowledge depends on the research activity being cooperative throughout the process of knowledge creation. In social sciences, this can lead to a major difficulty as subjective considerations come into play (this being the case of climate change). The interaction should result in a methodological efficiency, a moral egalitarianism, and accountability. This way of doing research differs from a more traditional model (Funtowicz and Ravetz 1993). Agrawala and colleagues (2001) proposed a model that, seeks to combine the basics of climate change research and human ecosystems with a more practical implementation level. It combines communication tools, decision analysis, predictions of climate, and research arising from the stakeholders involved in the climate issue. This model requires a profound change in current systems of knowledge production. It takes into account the limitations of equity among stakeholders, institutional arrangements, cultural differences between research teams, influence of the funding bodies to defining the political agenda, and academic freedom (Baldwin 2000, Malone and Rayner 2001).

Scientists remain common messengers, and scientific terminology permeates the conversation. Science is rooted in society and reflects the inherent inequalities and cultural paths, such as gender inequalities or the predominance of scientific knowledge over local and indigenous knowledge (Olsson and Folke 2001). According to social constructivism, any raised knowledge should embrace the cultural and the human aspects that shape environmental problems. Causes, impacts and solutions about climate change are as much about values as they are about science (Burch and Harris 2013). This calls for a "radical rethink" that acknowledges the need to understand that cultural aspects, beliefs, and attitudes are factors that shape what people get to know about climate change (Lahsen 2010). This aligns with the idea that, indeed, climate change can be socially constructed (Pettenger 2007).

2.3 Perceiving climate change risk

Environmental and climate change risk are latent constructs, as it is not clearly evident how the risk is going to turn into danger. The decoupling of social location and social decision-making responsibility becomes necessary. Approaching an environmental risk needs a *cosmopolitan outlook* able to unify interpretations on climate change from different stakeholders beyond nations and states (Beck 2000, 2007).

In this analysis, the risk is understood to be a product of perception and understanding and something that is socially constructed, so what is true or false is both a reflexive and subjective process. Risk perception is a psychological construct based on a variety of information sources and subjective concerns. On many occasions, information is minimal, and perception is influenced by internal factors such as personal experiences, and sociocultural factors within the community where an individual lives and belongs (Gierlach et al. 2010). Risk perception is also defined as the result of past experience that shapes individuals' perspectives (Douglas and Wildasky 1982), or the judgements that people make when they are asked to characterize and evaluate hazardous activities (Slovic 1992). As previously mention, in matters of perception and response to risk, there are two trends clearly differentiated, depending on how a person would respond to a danger situation (Rochford and Blocker 1991). The first is a more rational one. The second interprets risk as subjective (admitting the influence of values and culture).

The first position assumes a rational behaviour where humans are free of emotions, linear in their actions and decisions (Douglas and Wildasky 1982). The perception of risk is mostly a cognitive process (Loewenstein et al. 2001). On this basis the most logical and rational option would be to avoid risk. Under this rational approach psychometric studies have brought to light interesting facts. For instance, people tend to overestimate the risk if it is of direct concern, the familiarity of the risk makes it less dangerous, the circumstances of an immediate catastrophe attract more attention than risks that are postponed (Weber 2006, Spence et al. 2012). For this trend, the individual has a direct relationship with information. This perspective has also demonstrated that at psychological level also there is a barrier to avoid: the limited concern capacity of the individuals. That is, a *finite pool of worry* that makes people discard what has no direct effect on our daily lives (Weber 2006). This perspective has identified various psychological elements affecting perception and responses to risk and climate change. These barriers will be explained further in this thesis

Asserting that perception and responses to risk are solely due to objective reasoning could be misleading. Reality for an individual is (always) personally experienced as objective. It is

understood that risk responses are not only built individually (Shackley and Wynne 1995) because the reality where the human being operates arises from interaction with other peers, whose relations are based on the constant interpretation of meaning and knowledge. Risk has a strong subjective character and people also construe their reality based on interaction with their peers. This individualistic option, does not consider the possibility that risk operates from observations made in everyday life, and construction of risk sometimes emerges from interactions with peers (Macgill 1989). Risk perception as such requires an individual reflexive process that considers aspects of interactions with peers. The responses to risk do not necessarily need to be rational, or placed on a purely rational or conscious level. Many of the regular *habitus* practices (Bourdieu 1986) may be understood as risk avoidance because parts of these are already incorporated in the practices and routines of human beings and individuals. Some risks will attract more attention than others; this is because society chooses that way, either for cultural or value reasons.

The second trend of perception indicates that the ways of deeming and interpreting risk, along with information and knowledge received by people, lead to subjective connotations and "ways of seeing the world." For this trend, risk is considered as such to the context in which it occurs. Risk occurs in a particular space and time, so theoretical explanations should not be restricted to merely individual aspects. Subjectivity behind perception will justify diversity in opinions. This would again explain the variety of views and interpretations that accompany climate change.

Criticism of cultural aspects lies in the excess value that is given to the group, minimizing individuality, decision-making capability, and autonomy of the individual. Even though perception is mostly an individual process, the influence of social structure should not be overlooked. From a psychometric perspective, risk perception studies do not consider the symbolic values that can emerge from the social world because people are inserted into political and cultural frameworks. Incorporating the cultural perspective is needed to recognise that climate change, as our object of risk, happens in a territory that must be "governed", and human action interferes both in its causes and its consequences.

Two distinct theories currently dominate the field of risk perception studies. One is the 'psychometric paradigm', rooted in the disciplines of psychology and decision sciences, whereas the other derives from 'cultural theory', developed by sociologists and anthropologists. Not surprisingly, they have been developed within disciplinary boundaries,

even though both theories have made extremely significant contributions to the understanding of risk perception (Marris et al. 1998).

2.3.1 The psychometric paradigm

The psychometric paradigm was first developed by Slovic and colleagues (Fischhoff et al. 1978, Slovic et al. 1982, Slovic 1992). It aims at identifying the psychological dimensions underlying risk judgements and the cognitive map of diverse hazards and the underlying dimensions that lead individuals to perceive something as more or less risky (Steg et al. 2013).

One of the most significant assumptions within the psychometric approach is that risk is undifferentiated as to target and also to the concept of risk (Slovic 1992). Risk perception is hypothesized to differ as an effect of cultural, environmental and government influences and can be determined by media and trust. Furthermore, perception affects behaviour, so it may be possible to change behaviour by influencing perception (Slovic 1987, Sjöbergb 2000, Sjöberg et al. 2004).

The psychometric paradigm assumes that many of these factors can be quantified with an appropriate design of survey instruments. In studies employing the psychometric method, participants evaluate different rating scales for a heterogeneous set of hazards ranging from alcohol to nuclear power. Typically, between 9 and 15 rating scales are used (Siegrist et al. 2005). In 1978 Fischhoff et al. suggested nine general properties of activities or technologies important for the subjective risk judgement: i) voluntariness of risk, ii) immediacy of effect, iii) knowledge about the risk by the person who is exposed to the potentially hazardous risk source, iv) knowledge about the risk in science, v) control over the risk, vi) newness, vii) chronic/catastrophic, viii) common/dread, and ix) severity of consequences. In the study, people were asked to rate the "risk" of a large number of activities on each of the above-mentioned dimensions. These researchers showed that experts based their risk rating on the expected number of fatalities associated with that risk while laypeople had a richer definition of risk. Results from the study showed that common risk tolerance and perceived level of risk is well explained by two dimensions: dread and novelty of the risks.

In most studies analysing risk perception, averages are taken from all participants. The typical finding is that the qualitative risk characteristics that make up a hazard's profile are highly correlated. In the majority of studies, the correlations between the rating scales could be reproduced using two principal components labelled "dread risk" and "unknown risk" (Slovic 1987) coinciding with the results of Fischhoff et al. (1978).

The psychometric paradigm gave rise to the dualism of lay people versus expert knowledge (Jasanoff 1990), where people are seen as ignorant and emotional and experts are said to have the correct risk judgements. This dualism would lead to the idea that policy decisions should ignore public perceived risk (Sjöberg et al. 2004). However, it has been demonstrated that experts risk perception correlated with the psychometric model dimensions in the same manner as laypeople do.

In 1995, the psychometric paradigm was first adapted to the study of environmental risk perception by McDaniels and colleagues. They conducted a wide survey consisting of 65 items in four groups: natural disasters, technologies and their applications, human practices, and human beliefs. The study concluded that ecological risks could be judged based on five characteristics: impact on species, human benefits, impact on humans, avoidability, and knowledge. They concluded that risk is multidimensional, with many characteristics other than probabilities of harm. It is claimed as well that including "dread" as an explanatory variable of the psychometric model would explain part of the power of the model. It is relevant to see some critics pointing out that dread is a consequence of perceived risk, not a cause of it: humans normally see a risk and then fear it. It seems likely to happen this way and not the other way around (Sjöberg et al. 2004).

The psychometric paradigm, however, did not provide understanding of why different people perceive risks differently. It mainly led to a focus on the dread-catastrophe aspect of risks and ignoring the role of emotions and values shaping risk perceptions (O'Neill and Nicholson-Cole 2009, Whitmarsh and Lorenzoni 2010, Pidgeon 2012). Also, the psychometric paradigm approach failed to answer questions about why some societies fear some hazards and technologies and others do not, or how much risk is acceptable. Additionally it prevails the idea that risk perception cannot be studied in isolation, and the study of risk perception should embrace the social context. Authors perceived that the psychometric approach was not sufficient to explore the cultural context of risk perception and that a framework to see how worldviews and other cultural factors influence risk perception was needed.

2.3.2 The cultural theory approach

Cultural theorists have argued that the psychological approach has focused only on *abstract rating of risk* (Marris et al. 1998) and does not provide information about how individuals might differ in perceiving risk.

The cultural approach sheds light on why some societies select certain risks for certain reasons that make sense to a particular culture based on its shared values and concerns

(cultural bias). Culture is understood as the symbolic aspects of human society, a collection of symbols and ideas (Scott and Marshall 2009). Culture can be understood as a mental constructs, beliefs, and norms; and also as the social relations that determine individuals´ behaviour and attitudes. In either case culture is embedded in a person's way of life (Oltedal et al. 2004). Both ideas are integrated in cultural theory (Rodriguez-Priego et al. 2014).

The cultural approach makes people create a communal vision of risk, considering mutual obligation and expectations as a community. For Douglas, (1992) risk is socially constructed, it is an interpretation of a real risk that poses objective and real danger. The cultural stand acknowledges and addresses the related problem of how risk is to be judged acceptable or not via cultural frames.

For the cultural approach the most significant predictor for selecting what people fear is not individual cognitive processes (as proposed by the psychometric paradigm) but shared worldviews or cultural biases (Dake 1991). Accounting for risk from a cultural perspective would consider the same aspects of cultural analysis: i) patterns of thoughts and perception which are culturally determined, ii) learned pattern of behaviour, iii) and aspects of culture acting below conscious level.

The study of risk under culture perspective can be divided into standardised studies on risk culture and a socio-cultural perspective (Zinn 2004). The former examines how people's risk perception is culturally biased (Brenot et al. 1998, Marris et al. 1998). The latter focuses on the interpretation of risk according to membership of cultures and personal experience.

The study of risk a cultural lens was first considered by the *Cultural Theory*. Mary Douglas and Aaron Wildavsky originally proposed a cultural theory of risk in 1982 with the publication *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers*. The cultural theory gives importance to social groups and organisations that help people to maintain social order, societies and boundaries. To understand the different logics of risk the authors suggest a structuralist vision of social organisation as expressed in social groups. This implies a strong commitment to strengthening and maintains the internal bonds, the hierarchy levels within the community, and the cohesion of the community against the outside (Douglas 1985). This logic was set up in solidarity. Also, it means commitment to individual enterprise and fair competition. These ideas were further developed with Wildasky (1982) giving rise to the *grip-group* theory model of behaviour in cultural theory. The cultural theory is considered to be a suitable approach to account for

individual preferences (Douglas 1992). When accounting for risk Douglas (1985)points out that laypeople cannot think in terms of probabilities; they bring up some other concerns.

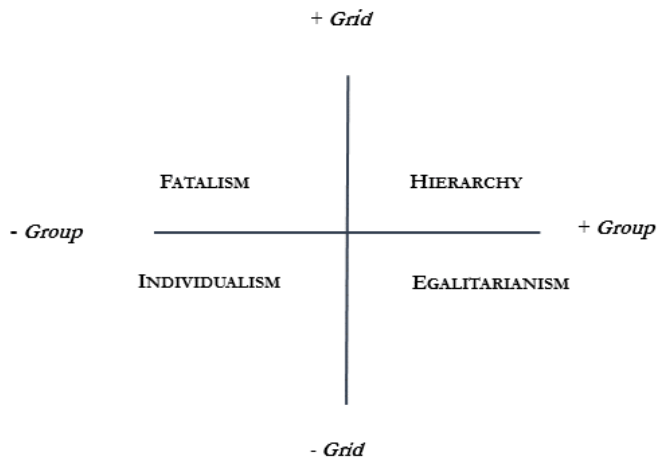
Cultural theory aims at explaining how people perceive and explain the world around them (Oltedal et al. 2004). It provides a basis for examining the cultural locations within which risk is conceptualized and dealt with in a particular sociocultural setting. Cultural theory argues that risk perception reflects the way in which society is perceived and that alternative views about risks flow from patterns of social order. The cultural theory of risk could be useful for answering a question like who is trusted to manage risk or who gets blamed in the case of disaster (Marris 1996)

The cultural theory consists of two elements. *Per se* it is a theoretical approach based on the belief that adherence to a certain patterns of social relationship generates a specific way of looking at the world. This worldview legitimises a corresponding type of social relation. The second component is a combination of cultural bias and social organisation based on two dimensions of sociality: group and grid. This was expressed in two indexes: the group index and the grid index. Group is the extent to which a person is incorporated and defined by bounded units or social collectivity. It concerns the degree to which individuals understand themselves to be incorporated into and defined by bounded units or social groups. The group index emphasizes the degree of cohesion among group members. The higher the group index, the stronger the distinction between "us" and "them" is. The greater the integration, the more the individual choice is subject to group determination. Low group position in the index reflects that the individual stands outside group boundaries, is completely identified as an autonomous actor, is individualistic and is attached weakly to the group. The second dimension of sociality is grid. It denotes the degree to which an individual is circumscribed by externally imposed prescriptions (i.e. norms, rules, laws and traditions). The other social distinctions and delegations of authority that limit how people behave with one another are based on individual behaviour imposed by group membership or by other structural factors. The more extensive the scope of prescriptions, the less life is open to individual negotiation (Thompson et al. 1990, Thompson 2010).

People at the end of the grid index ("low grid") face few societally imposed limits and guidance on how relations should be transacted. At the high end ("high grid") a set of externally imposed rules and guidance that constrain and channel options, are imposed on the individual. This would reduce uncertainties and bind interactions with others.

When the group and grid dimensions are overlaid, they produce four quadrants that combine the relative prescriptions of the grid with the relative attachments to group resulting in the four distinctive worldviews. The four worldviews or cultural types are defined by the grid and group characteristics and have been labelled egalitarianism, fatalism, hierarchy and individualism (Figure 2-1).

Figure 2-1 Douglas' grid-group model



Source: (Thompson et al. 1990)

These four types of social relations give rise to four distinct cultural biases. Egalitarianism is characterised by high group and low grid. Individuals are expected to negotiate their relationships with others. No one person is granted authority by virtue of their position. Fatalists are low group but high grid. Their autonomy is restricted by social distinctions. They tend to see themselves as outsiders and consider themselves to be excluded from institutions. Individualists are low in both group and grid dimensions. For them, all social boundaries are subject to negotiation. They are not bound by group incorporation or prescribed roles. Hierarchists are characterised by strong group boundaries and binding prescriptions. They are high group–high grid. For Hierarchists, a person's position in the world is defined by a set of institutionalised classifications, based on age, race, or gender. Hierarchists, like fatalists, see their autonomy restricted by social distinctions. These enable people to live harmoniously together.

2.3.2.1 Preferences according to the cultural theory typology

Cultural theory links environmental risk concern directly to preferences for environmental management strategies (Meader 2002, Poortinga et al. 2004), decision-making procedures (Jenkins-Smith and Sabatier 1999, Jenkins-Smith et al. 2012), democracy, myths of nature (Dake 1992, Steg and Vlek 2009a), and even climate change policy (Thompson 2010). Each of the cultural worldviews presents their own preference.

Individualists fear things that obstruct their individual freedom; politically, individualists are placed to the right. Individualists dislike paternalism. According to that cultural bias, people

do not need to care much about how nature is treated; they see nature as self-preserving, with the ability to re-establish to the status quo. Nature is harmless and resilient; it can recover from any exploitation and has to be manipulated and controlled through skills. Nature is fertile and full of possibilities that should not be restricted to boundaries/limits thus the environment should be treated as a free good. Those categorised as individualists trust other people until given a reason not to. Individualists set out the future with the expansion of private goods and forced shrinking population. For them climate change is important and should be treated through a technical discourse. For an individualist the main problem of climate change is that low prices in natural resources have led to over-consumption of natural resources.

Egalitarians fear development that may increase the inequalities amongst people. Only those putting the most in something will be allowed to get the most out of it. They are politically placed to the left (Oltedal et al., 2004). They are quite sceptical of expert knowledge as they suspect authorities and institutions might misuse the information to their benefit. Egalitarians believe in participatory models and choices but made by direct participation, ideally in small–scale, face-to-face, enhanced in the grassroots community. Trust and equality go together, hand in hand. For them, nature is seen as fragile, delicate, and fleeting. The earth should be treated carefully. Institutions that distribute unequally are distrusted. By nature, man is caring and sharing. Hence the State should not be involved in regulating environmental affairs—which implies getting rid of environmental subsidies. By using a common management of natural resources, society would be back to harmony with nature. In the terrain of climate change, they point that the main problems emerge from the level of consumption. The North spends excessively on food and other resources. The solution for them is simple and voluntary: use and consume just what is needed.

Contrary to egalitarian, hierarchical people do trust expert knowledge. They will accept risk as long as experts and government justify it. Nature has it owns limits. If people cross those boundaries nature will no longer be able to heal itself, with dramatic consequences. For them nature is controllable but man is weak and flawed. Therefore, they trust the role of environmental institutions to manage environmental problems. According to Hierarchists, only those with superior insight and virtue should make decisions. Hierarchists trust expertise and science. They believe environmental management requires certified experts, rationality to determine nature´s limits, and regulation to ensure that economic activities are within environmental boundaries. Economic growth is not by itself the solution. They consider excess of population to be one of the main causes of

environmental problems and climate change. They envisage the future with the intervention of experts and science.

People must deal with whatever nature brings along, is the rationale for fatalists. For them, nature is random and capricious. What comes from nature is quite uncertain. Fatalists feel indifferent to any risk situation. There is no use in building trust with others or being in harmony and synchronisation with nature. Learning from nature and to nature's benefit is impossible. They try not to worry about nature and risk, as people cannot control it. Fatalists have no voice regarding climate change or environmental issues, what they are supposed to be afraid of is decided by "others"-scientists, government-. As for public good, private good and common good, for the fatalist, the model of managing environmental goods does not make any difference, as they think they have been excluded from the managing processes. In words of Marris and colleagues (1998 p.3), *Hierarchists must regulate against extreme occurrences, egalitarians must treat the ecosystem with great care, individualists will have a laissez-faire attitude and fatalists will just cope with the events.*

Dake (1991) and Douglas and Wildasky (1982), in an effort to measure cultural theory, have developed a set of items for each worldview. They claim that three of the cultural worldviews (egalitarians, individualism and hierarchical) report a good level of risk perception. The fatalist category was not measured in these studies. However, further studies Marris et al. (1998) and Rippl (2002) tested all four measures and corroborate that the fatalist type was performing well in risk perception and found the dimension to be important.

One of the critiques of cultural theory is that risk and cultural approaches reduce risk perception to the categories of cultural bias (Wilkinson 2001, Zinn 2004) because the model presents ideal types which has open an intense debate about whether it is possible to measure culture with individual-level data. Even though some authors state that data can be inferred from an individual level, it *would never be a direct measure of culture but a measure of processes that are connected to culture* (Rippl 2002 p. 151). It is sure that social and institutional constraints influence the behaviour and belief of individuals but assumptions about risk are more complex and dynamic. However, the grid-group model is criticised for the simplicity and rigidness. The model is unable to account for the ways in which individuals constantly move between worldviews.

Despite criticism that this theory may have had, the contribution of cultural theory is undoubtedly important. It was an innovation to take into account the influence of cultural biases to understand risk perception. This theory allows understanding how culture

provides a framework of particular perception, which determines the way in which people apprehend the world around, how information is interpreted, and therefore, the way in which people value the risk. Values give meaning to the risks that surround us, so that for each culture there are "good" risks should be covered and "bad" risks to be avoided. The cultural theory was pioneer in incorporating this assumption.

2.4 Approaching environmental behaviour and attitudes

Not only cultural factors can affect perception and the way people construct and react to risk and climate change. Considerations relating to the importance of the environment may also affect individuals' reactions to climate change. Environmental behaviour should be understood as that quest to minimize the effect of individual actions on the natural world (Kollmuss and Agyeman 2002) or even benefit the environment (Steg and Vlek 2009a). This clearly differentiates between pro-environmental behaviour and environmental behaviour. The former is behaviour that harms the environment as little as possible or even benefits it. The latter refers to any behaviour that has an impact on the environment whether good or bad. This includes behaviour that implies both beneficial and detrimental actions to the environment. Measuring environmental behaviour, however, is a delicate issue. Most of the time it is measured by self-reports, hence needing an "attitude object". Self-report behaviour is sensitive to report biases and might not reflect actual behaviour. This could be counterbalanced by observation studies commonly used in anthropology or sociology research.

There are several predictors of environmental behaviours. Psychological aspects such as values, environmental concerns and ecological worldviews affect inclination towards one type of behaviour or another. Values, like general principles which guide the life of a person or social entity and provide a basis to attitudes and behaviours, can influence beliefs, intentions, and even behaviour (Thøgersen and Ölander 2002). Schwartz´s value theory (1994) and the motivational types he proposed have been used in explaining environmental beliefs and norms. Studies regarding values as a predictor of environmental behaviour have been the most traditional. However, because values are subject to influences, some other psychological aspects are seen as predictors of environmental behaviour such as environmental concern and ecological worldview. Environmental concern is often described as the general attitude towards the environment that displays a personal evaluation of environmental issues (Steg and Vlek, 2009b). That is to say the extent to which a person is concerned about environmental problems. According to Fransson and Gärling 1999), the determinants of environmental concern are age, gender,

ideology, and education. Considering these factors, a young postgraduate liberal woman would express stronger intentions for pro-environmental actions and would have stronger beliefs about consequences of environmental degradation (Dunlap and Liere 1978a, Leiserowitz 2003, Johnson et al. 2004, Office of Environment and Heritage 2007, Erdoğan 2009).

Kahan and colleagues (2010) consider that worldviews shape what one believes as well as how one processes new information. Beliefs about the relation between humans and nature are mirrored in the ecological worldview (Dunlap et al. 2000). Even though environmental psychology has developed several instruments to measure ecological worldview, the most popular measure is the New Ecological Paradigm (NEP) as will be explained.

The increased number of pro-environmental behaviour-related studies has led to the emergence of a number of models to understand it. Each model explains different patterns and propositions. The theory sheds light on different facets of environmental behaviour and assumes people make reasoned choices.

- Theory of planned behaviour

The theory of planned behaviour (TPB) -previously known as theory of reasoned action- was introduced by Ajzen and Fishbein (Fishbein and Ajzen 1975, Ajzen and Fishbein 1977). The theory analysed the influences on behaviour beyond people´s control; this is social and moral values. In TPB, the behaviour is originated by the intention to perform it. Considering this assumption, to carry out an ecological behaviour one must have a firm intention to perform it. The theory proposes that attitudes influence behaviour, but this is mediated by intention. The latter also mediates the relationship "knowledge-behaviour" and "values-behaviour". For the TPB, intentions are caused by the perceived control over the behaviour, a subjective norm to perform the behaviour and either a positive or negative attitude toward the behaviour.

- The Moral Norm-Activation model

The moral norm activation model (NAM) was proposed by Schwartz in (1977). It proposes that pro-environmental actions are a consequence of the activation of personal norms about such actions. The theory holds that pro-environmental actions occur in response to personal moral norms. This one emerged from four situational variables: i) problem awareness, ii) ascription of responsibility, iii) outcome efficacy and iv) self-efficacy (Schwartz and Howard, 1981 as quoted in Steg and Nordlund, 2013). Actions are activated in individuals who believe that environmental conditions pose threats to other people and other species. This model emphasizes the importance of individual responsibility towards

the environment. To act pro-environmentally, people should first be aware of the consequences. NAM notes that protecting the environment needs not only people to be aware of environmental issues (problem awareness) but also for them to understand that their behaviour might turn into effective action (outcome efficacy). This model is useful in explaining situations like energy conservation or payment for environmental protection.

- The Value Belief Norm Theory of Environmentalism

The value belief norm theory of environmentalism (VBN) model was developed by Stern and colleagues in 1999 as a theory to support environmental movements. It appears to be successful in predicting policy acceptability and environmental citizenship or adherence to social movements. It could be seen as an extension of the NAM theory, but VBN proposes that values and ecological worldviews influence the situational variables in NAM assumptions (Schwartz 1977), especially problem awareness. In VBN theory, the ecological worldview is a predictor for problem awareness, which influences an individual´s belief on whether one can act to reduce the environmental threat. The VBN links values, beliefs and norms through *a causal chain of five variables:* values (especially altruistic values), New Environmental Paradigm NEP, adverse consequences beliefs, ascription of responsibility beliefs, and personal pro-environmental norms (Stern et al. 1999). The VBN adopts the topology of values developed by Schwartz in 1992 in which human values were divided into ten value types and four value clusters. The VBN of environmentalism proposes that values influence individual beliefs that in turn give rise to a sense of moral obligation, which would lead—or not-to pro-environmental actions.

A common and general definition of attitude implies a mental disposition to evaluate an object, a person or an issue (Colman 2003, Steg et al. 2013). An attitude is *a more or less consistent pattern of feeling, thinking, and behaving towards a psychological object* (Colman 2003, p. 84). Since this definition is highly related to the idea of attitude, in this study we will be referring to ecological worldview as environmental attitude. The environment is an abstract concept; it needs to understand it as a set of objects, for instance: air quality, river pollution, etc. Hence, the attitudes toward one sub-object of the environment may influence attitudes to the whole. Understanding the ecological worldview of an individual is essential. It allows for the understanding of how environmental information is received. It is assumed that it is possible to have an attitude towards something without ever having the opportunity to express it in behaviour. In some occasions, people with high pro-environmental attitudes or orientations, lack participation in pro-environmental behaviours. Several studies report

this gap and shed light on how to engage people in pro-environmental behaviour (Kollmuss and Agyeman 2002, Lorenzoni et al. 2007, Whitmarsh and Lorenzoni 2010).

Attitudes towards the environment depend on a combination of personal characteristics, how the person experiences the environment and the context where the individual or group is set. Traditionally, socio-demographic factors have been used for establishing differences in opinion about and attitude toward the environment. Despite the fact that attitudes are difficult to measure, some scales have been developed to understand the relation of environmental concern/general attitude towards the environment and value orientation (Fransson and Gärling 1999, Milfont and Duckitt 2010):

- The ecological attitude scale developed by Maloney and Ward (1973). The scale is comprised of four subscales with 130 items, and it was later developed into a shorter version (Maloney et al. 1975). The first and second subscales measure "Actual Commitment" – what a person actually does to protect the environment-- and "Verbal Commitment"-- what a person says he/she does to protect the environment (originally to measure environment-pollution issues). A third scale measures "Knowledge" about ecological issues and the fourth one, "Affect" measures how an individual is emotionally connected with that issue.
- The Environmental Paradigm Scale (NEP), developed by Dunlap and Liere (1978). This paradigm is one of the most recently developed single component instrument in environmental attitude research. Dunlap and his colleagues have proposed that the rise of the environmental movement is linked to growing acceptance of a New Ecological Paradigm or worldview (NEP) - a view that human actions have substantial adverse effects on a fragile biosphere.

2.4.1 The New Environmental Paradigm

Nowadays, the NEP scale is one of the most used measures of endorsement of an ecological orientation (Amburgey and Thoman 2012) and people perception on the environment-human relationship (Poortinga et al. 2004). The NEP scale has been used to measure environmental attitudes and beliefs/concerns within the general public, children (Manoli et al. 2007), students (Schultz and Zelezny 1999, Thielking and Moore 2001, Bogner and Wiseman 2002), and ethnic minorities (Johnson et al. 2004).

To better understand the emergence of the new environmental paradigm, it is necessary to contextualize the human-nature relation of that time. Traditional thinking in Western societies assumed that humans were adapting and controlling nature to suit their needs. It was understood that the systems could stand an endless supply because there were

"abundance of natural resources". This idea was led by the scientific and technological progress of the twentieth century (Petulla 1977) and was captured by the so-called Dominant Social Paradigm (DSP).

The DSP focused on the idea that humans are separate entities from nature and consequently worthier than other species. Under the DSP paradigm, nature was understood to have just an instrumental value and preservation of nature was only related to the utilitarian value human placed on it. Scarcity was not an issue of concern because *basic needs "…are satiable, and the possibility of abundance is real."* (Dunlap 1980). Humans were considered to have skills to dominate and control nature. People *were socialized into a worldview that makes it difficult to recognize the reality and full significance of the environmental problems and constraints* (Catton Jr. and Dunlap, 1978 p.44). The DSP paradigm was manifested in a set of traditionalist and individualist values (Dunlap and York 2008, Erdoğan 2009). Major features included: *laissez-faire* government, private property rights, faith in science and technology, and beliefs in abundance and progress.

By the early 1970s, increasing environmental awareness emerged, acknowledging that humans and nature were interconnected; humans were indeed part of nature (Lundmark 2007). The social sciences began to consider the environment as a concern for people and started to question the DSP. Biologists by that time –for instance, Hardin (1968)—, assumed that modern societies were not "exempt" from ecological constraints. The environment was fragile, and resources were limited. This change in thinking was termed New Environmental Paradigm (NEP). Dunlap and Liere (1978) discern this alternative paradigm and identify three components -or facets-: i) concern about the "balance of nature," ii) belief in "limits to growth," and iii) rejection of the notion that human have the right to "control" nature. The NEP was believed to replace the view of DSP (Rideout, 2014) and *to contribute to a better understanding of contemporary and future social conditions than is possible with previous sociological perspectives* (Catton Jr. and Dunlap, 1978 p.42). The NEP recognised that nature was extremely delicate and rejected the idea of human exemptionalism (Dunlap and Liere 1978, Dunlap 1980). The NEP worldview is based on a careful planning and acting of humankind to avoid risks to humans and nature. In value terms, it is characterised by people recognising that everything on the planet is ecologically interconnected, they are thought to be more empathic to other life-forms and also to be cautious about the impact of human's actions on others.

The NEP scale originally consisted of 12 items on a four-point Likert scale response system (Dunlap and Liere, 1978). The original idea of the scale was to measure aspects

related to environmental quality. However, new environmental problems appeared, and the impact of human activities on nature were acknowledged (IPCC 1995, Stern 2006, Brundtland et al. 2012). Such problems created new environmental consciousness and consequently a new set of worldviews (Jones and Dunlap 1992).

In response to this, Dunlap and colleagues (2000) grounded the scale in contemporary attitude theory. They developed a set of statements embracing these emerging values and forms of understanding the environment with a new scale tested in 1990 (Dunlap et al. 2000)(Dunlap et al., 2000). To improve *its psychometric soundness* (Hawcroft and Milfont 2010a) and adapt it to the social and cultural context, the scale was revised to include 15 items with a 5-point Likert response scale. The authors added three new items to the original one proposed in 1978, and two more facets recognising the possibility of an eco-crisis and the belief that humans are subject to the restriction of nature´s law. Table 2-1 shows facets and beliefs in the new environmental paradigm. The facets marked with an asterisk are those included in 2000. Additionally, they adjusted the phrasing of the statements, avoiding *outmoded terminology* (Dunlap et al. 2000 p.425) which was one of the critical issues (Lalonde and Jackson 2002).

Table 2-1 Facets of the New Environmental Paradigm

FACETS	BELIEFS
Antianthropocentrism	Humans have right to modify the environment
Limits to growth	Earth has limited resources
Ecocrisis*	Humans harm the environment
Balance of Nature	Human activities have consequences on nature
Antiexemptionalism*	Human beings are subject to the constraint of nature

Source own elaboration based on Dunlap et al., 2000

Although the scale is widely accepted as an instrument to measure environmental concern (Poortinga et al. 2004) , it is still subject to criticism. Despite its language being changed and adapted, the debate as to whether the statements provide an updated vision of the ecological ethics be still on (Lundmark 2007). Specific NEP items have often been reworded and recombined to produce shorter versions and to suit the interest of individual researchers (van Petegem and Blieck 2006, Manoli et al. 2007, Collado and Corraliza 2012). The psychometric aspect of the scale is still an issue, as researchers used different ways to measure the scale. Instead of treating the different facets as sub-scales, researchers have typically summed the NEP items as a single measure of environmental attitudes even when

the scale is not originally conceived as unidimensional (Dunlap et al. 2000, Hawcroft and Milfont 2010).

2.5 Barriers to deal with climate change

Perception on climate change fluctuates between psychological explanations and sociological factors. Psychological factors, as well as sociological barriers, hinder people from their engagement with climate change. There are different types of barriers and these can also be classified in different ways. Barriers to the adaptation to climate change can be understood at two levels, individual and societal (Lorenzoni et al. 2007, Capstick 2012). Societal barriers are linked to the inaction of industry, political delay, bureaucratic rules, and natural variability of local climate. The latter remains a significant challenge for science and also policymakers (Hansen et al. 2012, Howe and Leiserowitz 2013a). Other classification includes institutional barrier, which are related to changing traditional ways of thinking, external environmental laws and internal operation procedures (Jantarasami et al. 2010)

Kollmuss and Agyeman (2002), for instance, propose that some of the barriers are structural, and others are in the psychological sphere (internal). Barriers at a personal level range from the lack of knowledge, uncertainty, scepticism, mistrust of science and information sources, to the natural variability of local climate. Weber (2006) draws attention to the idea of the limited concern about issues and presents worry as a finite resource, this being coined as a *finite pool of worry*. That is to say, people may brush environment concern aside if it does not have a direct impact on their lives or if they are not able to perceive it. That is why is important that people recognize the indirect effects climate change and global warming do have in their routines (Pidgeon 2010). Hence, as Gifford (2011) claims, dealing with climate change does not come naturally. The limited cognition is manifested, too, in unawareness of causes and consequences of climate change. Also, people will tend to inaction when they are unaware of challenging features in the environment due to the subtle changes. The global magnitude of climate change "excuses" people to act against it. However, people either think their actions will not have much impact, or they believe that they have little control over the outcome (Ajzen 1985).

Gifford (2011) exhaustively refers to psychological barriers. These can be categorised into seven "genera": limited cognition, ideologies, sunk costs, other people, discredence, perceived risks, and limited behaviour. For this particular research, attention will be paid to limited cognition, discredence, mistrust and uncertainty.

Climate change awareness can be analysed from different perspectives (Poortinga and Pidgeon 2003). Though the psychological viewpoint is an asset, sociology tends to

reinforce the idea that climate change´s concern is inherent to the system and does not depend on a specific, individual or isolated factor.

As mentioned elsewhere in the thesis, subjective perception of climate change is socially constructed under a constructionist approach. Thus, culture elements have importance in the matter. Because socialisation influences the way facts are seen, it also does it to the way danger and risk are perceived (Weber 2006). For instance, familiarity and daily exposure to risk slow concern regarding it, as people are used to dealing with and confronting it. Whitmarsh (2011) points out that the influence of culture elements can be seen in ideological variation. For instance, people or groups related to conservative thoughts would deny the fact that climate change is due to anthropogenic factors. On the contrary, left-leaning individuals have higher trust in environment portfolios proposed by governments (Pidgeon 2010), and might, therefore, accept the notion of climate change.

Another barrier limiting people perceiving and acting is the latent dimension of climate change. Perception of climate change risk is a complicated issue, as consequences are far and long in time and distance (Pidgeon 2010). This makes people undervalue future risks (discounting), as conditions are supposed to be worse when consequences are distant in time and space. Another important obstacle appears here, discredence. Mistrust in others and denial of climate change occurrence can also diminish adopting positive climate change behaviours. Mistrust in the scientific consensus and sources of information can favour anti-mitigative behaviours. Measuring mistrust is done by rating the level of confidence in different sources of information, or more frequently used sources.

Perhaps one of the most limiting barriers is the uncertainty of climate change (Poortinga et al. 2011). In many cases, uncertainty decreases the occurrence of pro-environmental behaviour, and it serves as an explanation for inaction (Archie et al. 2014). The uncertainty of climate change compromises the perception of scientific authority (Morton et al. 2011). Whitmarsh (2011) states that uncertainty about climate change appears from perceived conflicting and untrustworthy sources of information as well as defective sources of information.

In spite of the growing scientific consensus about the anthropogenic influence on climate, various discourses doubt the existence, origin, and causes of climate change (O'Neill and Boykoff 2010, Lewandowsky et al. 2013). Rahmstorf (2004) defines scepticism as a disbelief in the anthropogenic nature and the existence of climate change. Leiserowitz (2003) states that a sceptic is characterized by asserting that climate change is a natural phenomenon, doubting science and disbelieving that climate change poses a threat.

Capstick and Pidgeon (2014) sceptics can be categorized as doubting about the status of climate change as a scientific issue (epistemic sceptics) and those dubious of the efficacy of their actions (response sceptics). Substantial minorities of people think that climate change is not occurring (denial) (Dunlap 2013). Denial has also spread across the scientific community giving rise to a leak of non-scientific claims into the scientific work and discourses (Lewandowsky et al. 2015). Some studies have found that scepticism was strongly determined by individuals' environmental and political values rather than education and knowledge (Whitmarsh 2011). Others found that education, age, and economic status can influence scepticism (Islam et al. 2013). Social norms and beliefs are found to influence scepticism and uncertainty about climate change too (Patt 2007).

Chapter 3

THEM, THE PEOPLES

This chapter comprises two sections. Under the name of "them, the peoples" (referring to the Permanent Forum on Indigenous issues of the United Nations) the chapter first gives a general outline of the Community-based natural resource management approach. Secondly, it provides a description of the study areas in terms of location, culture, economy and governance system.

3.1 Background to community-based natural resource management

The community-based natural resources management (CBNRM) approach has evolved over the last decades as an alternative to top-down conservation strategies (Paavola, 2007). It was preluded by the conservation effort in the 1960s and the grass root approach that was focused on participation and local targets. In the 1980s, the sustainable and environmental development emerged as a priority on the political agenda. As an example of interest for countries to pursue sustainable development was the Earth Summit in Brazil in 1992 or the release of *Our common future* or Brundtland Report in 1987.

The CBNRM framework was recognised only from some decades ago (Blaikie 2006, Shackleton et al. 2010) as a *mechanism to address both environmental and socioeconomic goals and to balance the exploitation and conservation of valued ecosystem components (…) it seeks to encourage better resource management outcomes with the full participation of communities and resource users in decision-making activities, and the incorporation of local institutions, customary practices, and knowledge systems in management, regulatory and enforcement processes* (Armitage 2005 p. 704).

It is considered as an interesting option to match conservation and development and as such has been wildly adopted by major international organisations and donors (Berkes, 2007; Tang and Zhao, 2011), but the approach has also opened new political opportunities to communities to regain control over resources and social justice (Hayes 2007).

The CBNRM approach recognizes the right of communities to take control over their lands and resources and look for the positive transformations of the people-environment relation (Hackel 1999). Its underlying premise is that for conservation to be effective it is essential to take into account the needs of people living in and around the conservation area (Western and Wright 1994).

The CBNRM framework benefits local people and satisfies their needs to use natural resources, and it seeks to support long-term sustainability through a broad participation of community members and resources in decision-making (Zanetell and Knuth 2004). It includes a set of activities that vary around the world, but they all converge on the same goals: sustainability and development. Conservation practices vary from contexts and communities; differences are based on the perception of nature, culture and geographical contexts (Dodman and Mitlin 2013). Cultural patterns influence the criteria for inclusion and exclusion of groups of users recognized by the communities; the context in which is developed conditions each case of CBNRM (Berkes 2007). The cultural patterns of each community are expressions of their identity, their history and their experience of life. The

ethnic belonging often results in a shared vision of natural resources and in the proper way to manage it. In many instances, the traditional use of a territory is the base for the understanding of resource systems (Merino Perez 1999).

The community-based approach draws on the principles of social capital: norms, trust and networks (Coleman 1988, Portes 2000, Robison et al. 2002). Relationships of trust and reciprocity among users of common-pool resources are connected to the organizational experience and the community sense of belonging (Merino Perez 1999, Merino and Martínez 2014). Moreover, CBNRM organization considers trust building as an integral part to all of its initiatives (Olsson et al. 2004). Because the system is based on participation, trust, and reciprocity, the CBNRM is key in the development process and community empowerment (Merino Perez 1999, Amato Uriburu 2014). These emerged from the idea that applying CBNRM seek for fair distribution of benefits for those who may be subject to limited access to resources (Walker et al. 2002, Anderies et al. 2004). For this to happen and to build and maintain the social ties within the community information management and transmission is decisive. Accessible knowledge and context-based information can support learning and adaptation of the community (Armitage 2005).

In 1990, Ostrom identified a set of general principles that appeared to characterize the efficacy of collective management such as well-defined boundaries, correspondence between appropriation and provision rules and local conditions, collective-choice measures, monitoring, graduated sanctions, conflict-resolution mechanisms, minimum recognition of rights, nested enterprises.

With the same rationality as the CBNRM, community-based adaptation to climate change has proven useful to undertake strategies to adapt to climate change. The community-based adaptation engages stakeholders in a proactive problem-solving process that enhances social capital. It incorporates information about long-term climate change and the impacts of the planning process, it integrates local knowledge and perception of climate change into risk management strategies by community priorities and needs (Dodman and Mitlin 2013). Some experiences in Asia, Latin America or Africa have shown that the community-based promotes climate-resilient livelihoods, disaster risk reduction, and local capacity development (King 2014). People tend to participate in community-based initiatives and decision-making processes if they value their community, they depend on the territory's natural resources, and they are unsatisfied with the current conditions (Gruber 2011, Buijs et al. 2012). Moreover, climate change can alter the normal state of both the community and the territory.

The community-based approach is context specific, as the impacts of climate change. To satisfy people's needs and to reduce vulnerability to current and projected climate change impacts in communities dependent on natural resources, not only top-down interventions are required but also grassroots actions undertaken at the community level. Participatory and rights-based approaches can help to ensure that adaptation outcomes are efficient and sustainable

3.2 The study areas

The case studies were chosen on the basis of the project COMET-LA. The project worked in three cases covering a diverse range of situations dealing with environmental challenges in Argentina, Mexico, and Colombia. The analyzed cases chosen for the thesis were two Afro-Colombian community councils in Bajo Calima and Alto y Medio Dagua (Colombia) and Santiago Comaltepec in Mexico. The data and the information for the cases characterization were obtained from the stakeholders vision about the territory.

Stakeholders for Colombia were community members, community leaders, local nongovernmental organizations, government agencies, and academia. The description is truthful to stakeholders perception of the situation of the social-ecological systems for the Colombian case (Farah, Garrido, Maya V., Ortiz G., & Ramos, 2012). The data was completed by a process of systematization the Natural Resources Management Plans made by the Community Councils in a focus group and transects.

For the explanation of the Mexican case, the research data was gathered from different sources such as census, archives, and specialized articles. Also, in the description the knowledge provided by community members and local authorities (Escalante Semerena et al., 2012) along with other members of the project was used. In both cases, the information used to describe the case studies was part of COMET-LA deliverables and activities presented to the European Commission.

3.2.1 Consejos Comunitarios de Bajo Calima y Alto y Medio Dagua

3.2.1.1 Location and demography

Both Community Councils are located in the municipality of Buenaventura, in the Colombian Department of Valle del Cauca, on the Colombian Southwest Pacific coast area (Figure 3-1 and Figure 3-2). Calima has 66.764 has, while Dagua has 8.764 has. They belong to the Chocó bio-geographical region whose land extension is 7.259.000 has, covering the 5.3% of the overall Colombian territory. This region is also one of the most biodiverse in the world and provides the 79% of the timber used in the country.

Figure 3-1 Study area Alto y Medio Dagua

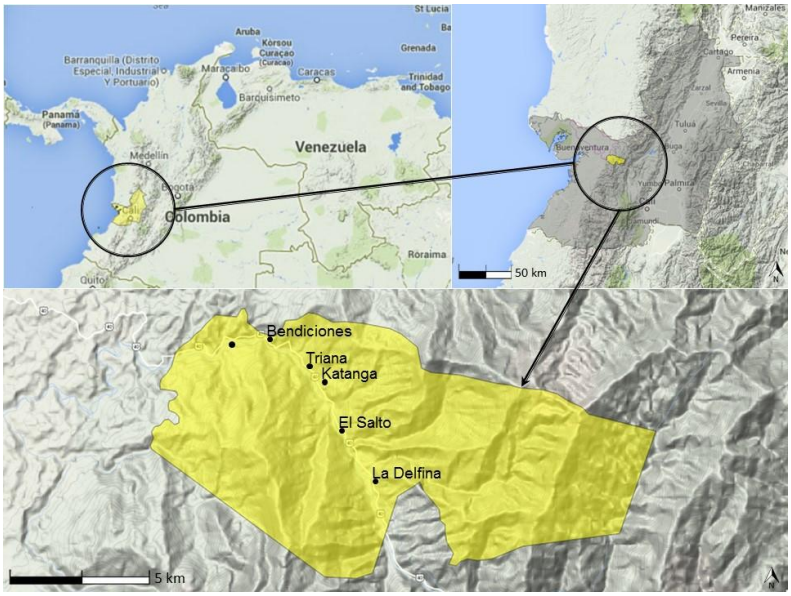
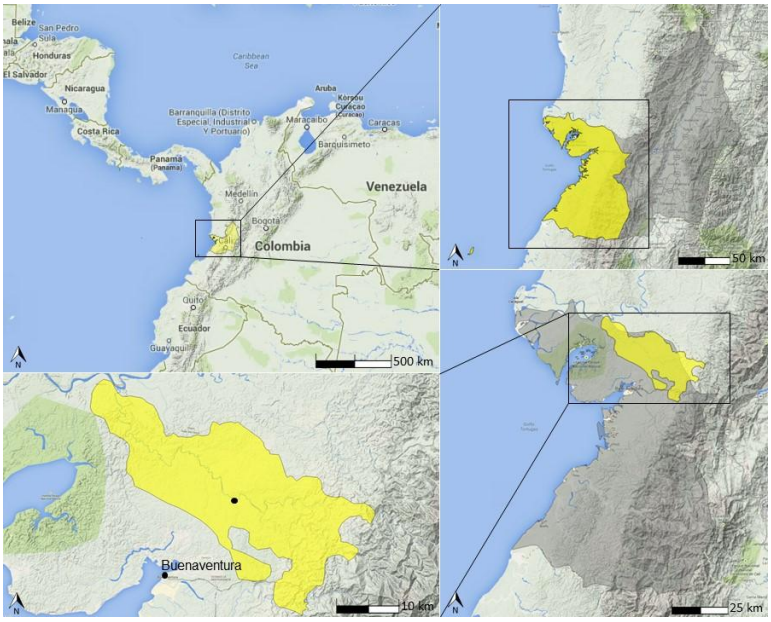


Figure 3-2 Study area Bajo Calima



The population in Calima accounts for 3.419 inhabitants, distributed among 1.013 families in 10 *veredas* or communities (Guadal, Ceivito, Trojita, La Esperanza, San Isidro, El Crucero, La Estrella, Las Brisas, Villa Estela and La Colonia). Families are characterized by being very extensive. Men are 52% of the population and women 48%. In Dagua, the population is 2.080 inhabitants, distributed among 507 families in 6 *veredas* (Zaragoza, La Delfina, Triana, Bendiciones, KM40 and El Salto). Distribution of the population by gender follows a similar pattern in Calima, 51% of them are women, and 49% are men.

3.2.1.2 Infrastructure and services

In both Community Councils, most of the community members have access to education and healthcare. However, these services are limited for those located far away from community centers (where schools and health centers are located). Water, electricity and sanitary services, are only available to a certain part of the population; the majority of them lacks basic public services. According to the Colombian classification of access to basic services and the daily income per capita, the majority of the councils population belongs to the lower strata 0 and 1 (being six the highest one).

In both councils, the rivers are used as communication and transportation means, especially in Calima. Dagua small communities are connected by a railroad, used by community dwellers as a mean of transportation adapted to their necessities. The river and a secondary road connect Calima communities, yet the majority of the Calima's territory is not connected via roads, leaving the Calima River as the only option for transportation among communities. Due to the density of the forest or to the presence of illegal armed groups some parts of the territory are not reachable.

3.2.1.3 History and Culture

Culture is a crucial element for black communities. Their identity is attached to their ancestral history and values, and it is a central element of community union and representation. External stakeholders perceive black communities as kind, cheerful and open. This is a great asset in terms of social bonding, cooperation, and trust. Cultural values are linked to productive activities and orient the patterns of resource extraction and environmental conservation. Both councils have a cultural and ancestral background of high value. The knowledge on the use and management of natural resources have allowed a harmonious relationship between men and nature. Currently due to the gradual and daily interaction with other cultures and media, their culture has been transformed and lost many of the ancestral cultural values. This can be seen especially among young people whose aspirations align with what imposed by the media and urban areas, such as Cali, Tulua and the town of Buenaventura, instead to what the territory offers. In the Black communities at Alto y Medio Dagua culture is represented in various ways. There is a wealth of oral language, that can be seen in words, and traditional sentences adapted and combined with the Spanish accents and own expressions. For instance, considering the type of fish, people know the best way and month of the year for fishing. Also, traditional ecological knowledge is represented by techniques of harvesting medicinal plants, knowing of climatic patterns or artisanal gold mining techniques.

Understanding culture cannot be understood without understanding their history as a community. The first settlers ("*colonos*") arrived in Calima in the 1940s and settled alongside the rivers. They were black people arriving for gold mining, mainly from the Department of Chocó. This was the time when the timber extraction for the railroad construction started. A decade after "Cartón de Colombia" (a paper factory) was established in the region attracting workers from other parts of the country (Cauca, Chocó, Bajo San Juan, Valle del Cauca, Risaralda, and Quindío). At that time, Calima was already a melting pot: white, mestizos, black and indigenous arrived. The arrival of the palm oil factories in the 60s and the road construction lead to an increase of the population in the 1980s and 1990s. Nature-related activities grew while new settlers arrived. Inhabitants fished, hunted, gathered forest fruits and extracted timber in a selective way and they were also engaged in artisanal gold and platinum mining. In the eighties the territory lived some economic and social changes that were accompanied by a non-selective logging process. Pressure from the communities resulted in the non-renewal of the concession with "Carton de Colombia", prompting an outflow of people from the territory.

The arrival of paramilitaries in the region during 1998-2000 was a turning point in the history of the community, not only at social but also at the environmental level. The introduction of coca crops at the expense of other agriculture crops had a great impact. The government carried out aerial fumigations with glyphosate to eradicate the illicit crops affecting people's health and environment. This affected not only the coca crops but also the crops for food and the people. As a consequence of the violent conflict, many inhabitants of Calima were displaced. In 2008, the Community Council proposed the manual eradication of illicit cultivation in their territories, with the idea of recovering their crops for food.

The Community Council of Dagua starts receiving population in 1960. During the 1960s and 1970s decades, trust and reciprocity were the core of production relations between inhabitants. These were given mainly by the *minga* (members of the community worked together without remuneration) and *mano-cambiada* (labor exchange) systems. In the 90s, these patterns moved towards a monetization of social relations. An important moment for the community was the forced displacement suffered in 2000 due to violent conflicts.

The history of the community has been linked to natural resources and biodiversity. However, the over-exploitation of natural resources led to a decline in environmental supply. Animals have been forced to move from and towards more distant location due to activities such as mining or road constructions. The quality and quantity of water decreased

since the early 70s. A likely explanation of this could be the increasing of gold mining activities, the building of a hydropower plant and the landscape transformation. Since the early 80's, local communities and State institutions such as regional environmental government agency (CVC) have established regulations to reduce the harmful impact of mining and infrastructure building on water resources.

3.2.1.4 Economic activities and natural resources

The sources of employment in the area of study are traditional economic activities, such as agriculture, mining, timber and gold extraction, and fishing. In Dagua and Calima, gold mining is part of local livelihoods. Artisanal techniques and related knowledge have been kept across generations; still the amount of gold has consistently decreased over the years. These activities are part of local livelihoods and matters differently depending on the topographic areas and the specificities of each community.

In Dagua agriculture is the main economic activity. Approximately 167 families are committed to this activity, growing over 25 species of fruits and vegetables as part of diverse production systems compositions. The timber extraction does not have a significant importance; it employs around 11 families in the territory.

In Calima, agriculture plays an important place but is not as significant as timber extraction. The importance has decreased over the years and timber extraction does not cover the daily monetary needs. Local livelihoods are varied and are arranged all through the year. Family members alternate the above mentioned activities with other sources of employment: health, education and housework in the main cities around. There is a high percentage of informal jobs in the territory.

An exploratory diagnosis conducted within the COMET-LA Project has shown that people tend to get monetary resources from different activities, such as construction, commerce, domestic duties. In general, most educated members of the community have access to other sources of income from non-government organizations or projects.

A high biodiversity in terms of fauna and flora characterized both Community Councils. People in the communities have access to numerous natural resources: abundant watersheds, vast forests, and proper soil and climate conditions for the conduction of various productive activities. Community members recognize that their territory has a high level of biodiversity. According to them, fauna and flora have been used ancestrally in a rational and sustainable way by local communities and water resources were affected because of the deforestation Lately, people in the communities acknowledged more frequent storms, flooding, and droughts changing local climate conditions, accelerating the

transformation of forest and water beds. For the inhabitants, the climate variability is evident they have observed more rainy months than dry months. Despite all this, Community Councils inhabitants do not perceive a clear relationship between climate variability and decreasing of crops for food. Climate change is identified as an issue.

3.2.1.5 Governance system

According to locals' perception, the enactment of Law 70 of 1993 was the keystone of community organization, as it gave rise to the Community Councils.. The Community Councils were created with the idea of recognizing people ownership of the land, the territory, and the resources. The Communities have the right to decide who can be a member of the Community Councils. The majority of the plots are being inherited from generation to generation; new families are coming to the territory, and most of them follow the rules of the specific community in which they plan to settle.

Prior to the creation of Community Councils, the Boards of Community Action were the main interlocutors between communities and the government to discuss on guidelines for community development.

In both Community Councils, natural resources are managed communally. Governance among communities is driven and coordinated by a set of organizations in the Councils. All registered community members constitute the General Assembly, whose approval is vital in the decision-making processes of the Board of Directors. The General Assembly elects one a legal representative who embodies the interests of the communities. In 2005 to facilitate expanding the base of community participation, the *veredales* committees were created. Each community elects their representatives, who also become members of the Board of Directors. This provides the community with full representation in decision-making, socialization and validation processes, regarding the specific issues of each member of the community and the collective territory as a whole.

Each community council has a *Reglamento Interno* (internal rules). In the Community Council of Dagua, the internal rules forbid conducting some hazardous activities for the environment. For instance industrial mining, contaminating water, forest felling, animal hunting for commercial purposes, using herbicides, dynamite or other chemical substances for the fishery, and burning out the soil or garbage. They acknowledge that almost the 80-90% of the population are aware and follow the rules. However, people outside the community (external actors) are consistently breaking some of them. In the Community Council of Calima, the internal norms are oriented to the conservation of the protected area. Within the Community Council of Calima, people perceived that internal rules are

partially met such the prohibition of contaminating the river is not fulfilled. Rule-based behaviors give recognition, social acknowledgment, and a positive reputation of members of the community.

When an external actor is seeking for resource extraction in the council's territory, the validation and the agreement in Community Council is compulsory. This procedure is called *consulta previa* (previous consultation) and it is recognized as a fundamental right for indigenous, Afro-Colombian and raizales by the Colombian Law 21 of 1991. The implementation of the Law significantly contributed to community's self-determination because it aims to ensure the rights of indigenous and tribal peoples to their territories. The previous consultation led to a series of commitments and agreements apart from necessary exercises of diagnosis, assessment and validation. The communities have to be consulted whenever legislative or administrative measures may affect them directly. This is a way to ensure they have the opportunity to comment on those projects or decisions that could alter their lifestyles, affect their development process or impact, either way, in their customs, traditions and institutions.

Both communities are still dependent on national institutions, this limiting their capacity for decision-making. The Corporación Autónoma Regional del Valle del Cauca (CVC) enforced external environmental rules in both Community Councils. For example, towards polluting or extraction practices already governed by internal norms (timber and river material extraction (except artisanal way), hunting, and deforestation. The CVC is the highest public authority in the territory in charge of devising policies and rules to control the use of non-renewable resources. Since the 60s in the Community Council of Calima, Governmental institutions are present in the territory. Since the latest 80s, some civil society organizations were and still are crucial in the Community like the "Organización Negro-Campesina Proterritorio Calima ONCAPROTECA [3] ". This organization was essential for the creation and alliance of the Community Council of Calima River lower basin in the 90s. Nowadays, there are many State and private institutions in the territory, some of them with a close relationship to the Community Council.

In Dagua community, there are as well different external institutions in the territory. During the decade of the 1970s, the presence of the Mayor Office was necessary as it

[3] Black-Peasant Pro-Calima Territory Organization

participated in the construction of the communities. By that time, Ecopetrol (Colombian Oil Company) and some other timber companies played a key role in the regional economic development. Since the early 80's, the National Natural Resources Management and Protection Institute (INDERENA) the organisation is active in the territory. Later the regional environmental government agency (CVC) increased its participation in the natural resource management.

3.2.1.6 Conflicting issues in the territory

The changing relation between nature and economic activities in the territory has led to struggles affecting either directly or indirectly to communities.

The main conflicts in Dagua stem from the human-environment relation. The illegal mining, pollution of water sources and infrastructure building, have generated harmful impacts on local natural resources. Illegal gold mining not only creates and promotes conflicts among local families but mainly with external actors. Gold mining has affected social relation and has also modified natural patterns; for instance the watercourse has been altered to obtain sand and minerals. Landscape changing is recognized to be another source of the social-environmental struggle.

The Community Council of Calima is suffering deforestation, water pollution, and hunting. But the central concern is the cultivation of coca leaves because it is an illegal activity involving different groups of actors. The government forced eradication programs using aerial spraying of coca crops with glyphosate and military actions in the territory. The conflict has resulted in forced displacement, deforestation and contamination of water sources. Water contamination results from the interaction between local actors, transport, miners, and illegal crops. Consequently this affects the dynamic of the crops. Another issue in the territory is related to timber extraction. In the 1970s, in Colombia, the "*Asociación Nacional de Usuarios Campesinos ANUC – Línea Sincelejo* gave permissions for deforestation that strongly affected the biodiversity in this region.

Some minor issues are also worth noting like hunting and illicit trade of biodiversity. Wildlife trafficking continues affecting local biodiversity despite rules devised by the CVC and the efforts of national police to interdict the activity. In this case, the CVC has a very limited control capacity and scope for action due to limited resources and human capital, and illegal actors also involved in this activity.

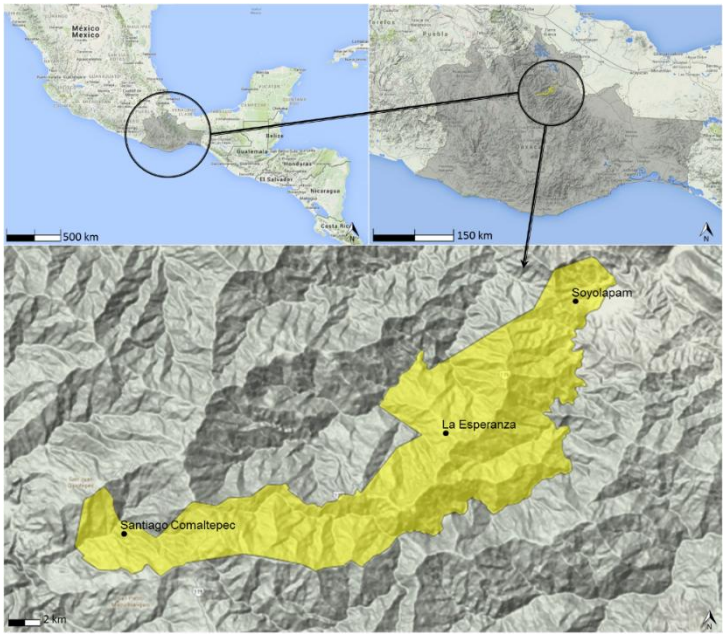
3.2.2 Santiago Comaltepec

The Sierra Norte of Oaxaca is known for its conservation values, and for the cultural diversity. Santiago Comaltepec has become a paradigm for both the conservation of natural resources and social justice.

3.2.2.1 Location and demography

Santiago Comaltepec is a Chinantec community located in the Higher Chinantla, which is part of the Mesoamerican bio-cultural region. Figure 3-3 shows the State of Oaxaca and the Municipality of Santiago Comaltepec

Figure 3-3 Study area Santiago Comaltepec



The state of Oaxaca is located in the South of Mexico at the confluence of the Sierra Madre Oriental, and Occidental, and the Cinturón Volcánico. This geographical position explains the varied landscape and the biological diversity defining their identity as a community. The geographical location of this area attracts much of the humid winds from the Gulf of Mexico. This territory is acknowledged for the good conservation of its temperate forest, rainforest, and mountainous cloud forest.

The communal territory is part of the upper basin of the Papaloapan River, the second longest Mexican river. The extreme temperatures determine the environment of the community. There are around there were 1115 inhabitants distributed in three settlements in the territory (INEGI, 2010). A principal nucleus, Santiago Comaltepec and two small villages, La Esperanza, and San Martín Soyolapam. Santiago Comaltepec is located at 3000

masl. Most adults in the territory are women because men tend to migrate in search of jobs. Land use is classified into three classes: 1,726 ha are allocated to forest production, 10,300 ha to forest protection, 127 ha to forest restoration, 6,108 ha to agricultural and agroforestry uses and finally 108 ha to urban use.

3.2.2.2 Infrastructure and services

The town of Santiago Comaltepec is about a three-hour drive north of the city of Oaxaca, the state capital. The main access to Santiago Comaltepec is Federal Highway 175 that along with secondary roads connects major population centres. A community-owned transport service is operated by a bus service to and from the city of Oaxaca to Santiago Comaltepec twice a week. In Santiago Comaltepec people have access to water and electricity provided by State Companies. The price for electricity is subsidized, but still too high if compared with the local people's income. The houses located farther away meet their water needs turning to nearby small rivers. In Santiago Comaltepec, the houses have drainage.

A high school exists in Santiago Comaltepec secondary school, the other have access to tele-secondary education. Seventy-three percent of 15 or more years old female population reads and writes and 88.94% of the male population. School attendance ratio is 73.35 for females, 74.23 for men, 75.16 in average. Youngsters emigrate to access better and/or higher education levels

3.2.2.3 History and culture

Comaltepec town was founded in the time of other Chinantec villages. No less than four indigenous groups existed there before the Spaniards arrival. In 1602-1603, people were gathered in settlements which today are Santiago Comaltepec. In 1659, the church, and other essential infrastructures were built, and Comaltepec asked the federal authorities to be authorized to the status of "town." The entitlement was guaranteed in 1735. It was granted in 1735. One century after, the authorities issued property titles to Santiago Comaltepec. Since then Santiago Comaltepec has faced deep changes, but the community has successfully adapted to them.

The maintenance of social structure based on the communal property has led to a set of institutions that have fostered sustainability as a prime cultural value. Trust, reciprocity, and legitimacy is the base for culture and governance in the territory. The maintenance of social structure based on the communal property and the communal ownership has derived in a

set of institutions that have fostered sustainability and commonalities as leading cultural values. Culture is one of the strengths of the community to preserve the territory, and it is also expressed in the use of their Chinantec language. The language is spoken by the 87% of the population. The community has their popular and traditional dances, clothes, and food. However, traditional values collide with new ones e.g. individualism versus collectivism. Traditional culture clashes with the younger generation and women, who claim for more modern perspectives and for women to exercise their rights. Despite of being recognized by the communal system, traditional culture is restrictive for women to perform their rights. Although asymmetries are not an important characteristic of Comaltepec´s society, sustainability does not guarantee to meet people's present and future needs.

3.2.2.4 Economic activities and natural resources

The community has communal property rights over 18,366 land hectares. In 2008, the forest entitled back in 1953 was ratified by the Mexican Government and certified by PROCEDE (the Programme for the Certification of Ejido Rights and House Plot Ownership).

Eighty-six percent of the total source of the municipality is considered production forest areas. The land and timber in Santiago Comaltepec are communally owned, but simultaneously some agreements respect the ownership of the agricultural and urban land of each family. All community members that fulfill their obligations are entitled to use land, forests, water and other resources. Community members are allowed to have a place for building their home. Community members have an urban lot for building a house and an agricultural plot and/or grazing land. The community recognizes each family's land ownership as long as they keep working on it.

In the community, the property, extraction and exclusion rights are clearly defined. Before granting any wood harvesting permit to any commoner, the General Assembly of Commoners must ensure that the community members have met their duties in the community. When a commoner requires a considerable amount of wood it needs to be approved by the municipal authorities, and he has to pay a fee. Thus, all community members know that they are not allowed to perform extraction or production activities within its boundaries. The agricultural lands are allocated to individual community members whose rights are clearly recognized in deeds or wills.

In 2010, the employment rate in Santiago Comaltepec was one of the lowest in the country (25.6 %,). Women only represent 14 % of total employees. Nevertheless, it does not mean

that they do not get involved in the community activities, but they do not perceive any salary. Ninety-nine percent of the total production units in Santiago Comaltepec are involved primarily in agriculture. Agriculture is the main family activity in the municipality, and it is focused on self-consumption. Timber and coffee production are sustainable cash revenue sources. In the case of wood this can only be sold by the community and the money is invested in the community. In recent years, 10% of the timber production has been paid to the '*Comisariado de Bienes Comunales*' (Communal Property Commisionner).

In the past, the residents obtained cash income by selling crafts from a bromeliad. More recently, they have been growing and selling coffee beans for export markets. Today, their main cash source is timber production. Lately, two community companies have been created: Industria Forestal Maderera de Santiago Comaltepec (Santiago Comaltepec Forest and Timber Industry Company) and Ecoturismo Comunitario Cascada de Niebla. (Cloud Forest Waterfall Community Ecotourism). The profits are used for the social benefit of the community.

Remittances from community members working in urban areas in Mexico or the United States are another source of cash income for families in this community.

The Sierra Madre Occidental represents the major rainforest reserve of the country. Biodiversity is one of the main characteristics of Comaltepec's forests. The hydrographic landscape is characterized by the presence of numerous permanent and temporary streams that flow into the Rio Grande, Río Bobo and Río Zoyolapam, the main three permanent rivers in the region. More than half of the communal territory is protected while the rest may serve for productive uses, either agricultural or forestry or for home use. All commoners have access to natural resources located within their legally recognized limits. The land use potential determines lands in Santiago Comaltepec. This type of planning in the Community has proven successful in preserving resources for an extended period.

The communal natural resources management system of Comaltepec exhibits a good ecological performance. Specialists consider the community's mesophyll forest as one of the best-conserved areas of this unique world's ecosystem (Martin et al., 2011). Since 1993, Comaltepec forest management system, in particular, has been considered as an example of sustainable forest management according to international standards (Markopoulos, 1999; Smart Wood Program, 2006). In the territory, fires are not frequent and are mainly due to anthropogenic factors.

Climate change could pose a threat to living conditions of people in Santiago Comaltepec. People in the community consider that frequent storms and rain are safe for agriculture and

the forest. Should the weather change, forest productivity would drop accordingly, and this may affect output. However, the community lacks an adaptation strategy to mitigate the effects of climate variability. The National Forest Commissioner has put some effort on reversing this situation. If the weather changes, "as it has", people in the community would be more exposed.

3.2.2.5 Governance and associativity

The Mexican Constitution allows indigenous communities to have their rules for social and ecological performance with a certain degree of autonomy allowing the common management. Even though local rules are embedded in state and federal laws, people in Santiago Comaltepec organise the administrative management of the territory. It is a direct democracy model where community members play both administrative and management roles. This gives a significant degree of autonomy to rule communal and municipal affairs. It also incorporates the use and conservation of community resources such as the forest. Since 1994, the forest management is based on the Land Use Plans and Forest Management Programmes approved each ten years by the Mexican environmental authorities. These plans are developed by the UZACHI, a technical organization hosted by four Chinantec and Zapotec communities, which plays an important role providing technical assistance to these communities in forest management and timber trade since 1985.

The customary practices and traditions are inherited generation after generation; the community recognizes the rules as legitimate and fair, and this acknowledgment ensures a high degree of compliance. Furthermore, reciprocity plays a crucial role in the social system. The social awareness created around environmental issues have produced an unyielding social capital that safeguard the forests and resources.

The governance system is well structured and hierarchical. The maximum authorities in the communities to exercise such democratic model are the General Assembly and the Assembly of Commoners. Both municipal and communal authorities are accountable to the community. They are required to give explanations to citizens or commoners assemblies that regularly meet at least every two months.

The governance system is headed by the General Assembly that is in charge of the administrative management of the Community. Since the community's foundation, it was governed by the unwritten or consuetudinary laws and the Assembly of Commoners takes most of the decisions, turning any agreement into law. The system maintains the internal order and conflict resolution. The community has developed a system of governance based

on the provision of services and work that each one of the community should pay over their working life. The community life is governed by the system of *Usos y Costumbres* (tradition and customary practices that have not been created by the State), which consists of two key social institutions, *tequio* (unpaid days of community work) and *cargos* (unpaid positions of responsibility to manage the resources and the territory). Cargos are elected two or three years in advance to let the commoners organize their livelihood options. Their role is essential to maintain the community-based management.

Under the traditional system, where a commoner is reputed for his/her track of service, there is a strong incentive to perform well. Under the system of "social prestige", poor performance could have serious consequences.

All householders must perform a compulsory service in the governance structure (both civil and religious). Most of the *puestos* (posts) or *cargos*, are occupied by men and, in their absence, their responsibilities can be taken by their wives, children or parents. The posts are voted by the assembly and the elected members work for the appointed for at least a year. During their lives (from 18 to 60 years old), all community members have to play different roles in administrative affairs. This obligation derives from their status as commoners and their duties in the *Comisariado de Bienes comunales* (Communal Property Commissioner).

The Assembly of Commoners is the main authority regarding the use of the natural resources. It the rules for the access and use of natural resources and takes all the decisions related to rights of use, conditions of use and sanctions to rules-breakers. They establish and have the right to change operational rules for commoners and the commons.

In Santiago Comaltepec, each group of 150 families is headed by a person who holds the status of a commoner. Every commoner (as far as he accomplishes his duties) can be directly involved in the decision-making process and decide about the community affairs. This primary classification produced user groups that receive direct benefits from the forest, such as shepherds, woodcutters and collectors and farmers. Is in the community to include both new community members and the so-called 'foreign inhabitants' who are devoted to raising cattle using forest clearings for free grazing. Collective production activities are planned by the particular group dedicated to the specific activity (e.g. shepherds) and are discussed and decided at the Assembly of Commoners. The role of women is minor. Only since 2010 women are accepted as commoners and still the representation is far from equal.

The Surveillance Council watches for compliance with positions and work and it is necessary for the decision-making process in the community. It is integrated by respectable community members and the *caracterizados* group (those who succesfully perform their *cargos* and *puestos* as a way of rewarding). It tracks that commoners attend commissions, fulfill their obligations in the management of the territory, household labor, self-consumption agriculture, livestock, and monitoring activities. Another implementing body is the Municipality Council. This takes the responsibility of implementing the citizens' assembly agreements, regarding public services, including public spaces, water, sanitation, health, education, roads, cemeteries and marketplaces. There are as well different commissions in charge of the administrative and regulatory functions in the territory. Both the Surveillance Council and the Communal Property Commissioner are part of the Assembly of Commoners.

The governance system in the community also integrates government institutions. The Ministry of the Environment embodies responsible for granting regulatory permits for logging and publishing rules and regulations related to the forest and other productive activities. Other associations such as 'Estudios Rurales y Asesoría, A.C. have helped to promote the creation of a protected area by the community itself.

3.2.2.6 Conflicting issues in the territory

One of the preoccupations arises from the increasing reluctance of people, particularly among the youngs, to perform community jobs without payment. The territory is suffering from migration. The lack of employment affects the economy in Santiago Comaltepec. The territory is unable to provide young people with opportunities. Agriculture is for self-consumption, and forest-related activities can only give employment to a small number of people. Another tension arises from their concern to maintain their traditions and the need for finding new economic paths to economic and social growth. For instance, women are excluded from major decision-making processes. Legally, women can and do participate in institutional arrangements, but their role is very minor. However, it does not seem to create problems within the community.

Chapter 4

METHODS

This chapter describes the methodology and methods used in the research. The description of case studies has been included in Chapter 3 due to the extensive characterization. The chapter includes the justification for methods, and then it briefly describes the stages in the research. It first starts with how the literature review was conducted; secondly, it continues with the survey methodology. In this section, the survey design, the items constructions, data input and analysis and questionnaire limitations are explained. Finally, the rationale for Q-Methodology is described. A brief theoretical explanation of the method is included for the sake of clarity. Following that part, it is explained how the Q-Methodology was carried out for this research.

4.1 Rationale for methods and research stages

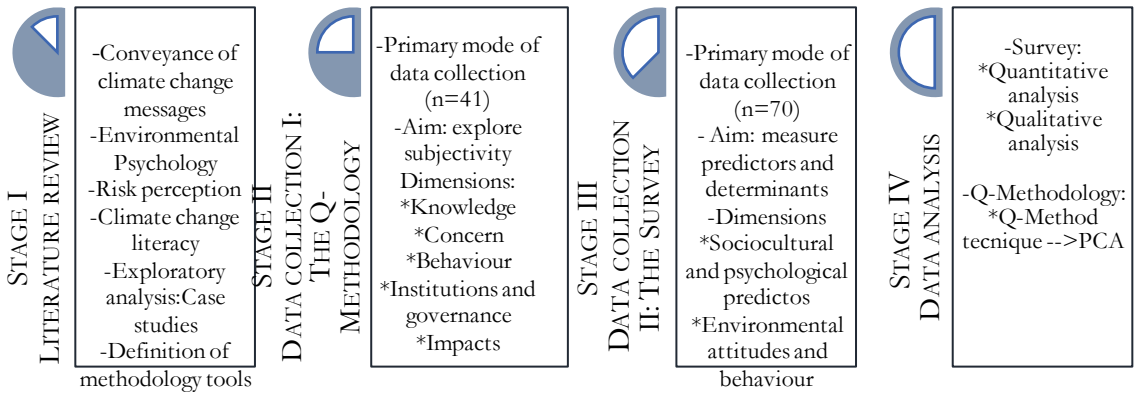
The aim of the study is exploring climate change perception on two communities where people depend on natural resources for their livelihoods. The research explores a broad range of aspects related to environmental attitudes, behaviours, and knowledge about climate change. At the same time, the focus is on the relationship between traditional variables predicting climate change perception and the risks associated.

This thesis does not only attempt to quantify relationships among variables, rather it describes a whole of view of climate change. For the objective of the thesis, it was considered necessary to work with a quantitative methodology to look at the relationships between variables and compare and contrasts between case studies. The use of a quantitative methodology was also needed to test the cultural theory and the new environmental paradigm. However, for the whole understanding of perceptions, the quantitative methodology would miss desirable information regarding the participants' views. A methodology able to capture subjectivity and to measure psychological aspects of climate change perception was needed as well. The qualitative methodology would help to "construct" the whole picture of climate change perception capturing subjectivity. Furthermore, qualitative methodology is understood as part of the constructivist approach that is the underlying philosophy of the research. The quantitative and qualitative approaches complement each other and are by no means exclusive (Gorard 2003, Singh 2007).

Two methods were used for meeting the research objectives: a survey and Q-Methodology. The survey method profiled the sample population (Check and Schutt 2012, Stoop and Harrison 2012) and explored how hypothesized predictors and determinants of climate change perception and environmental attitudes relate to each other. The small number of respondents in the survey allowed performing a detailed analysis based on each case study. This *relies on fully understanding the wholeness of a particular case and understanding particular attributes of a person* (de Vaus 2005 p. 4). Incorporating a quantitative survey method allows comparison measures traditionally used in climate change perception studies. For exploring, subjectivity in climate change perception Q-Methodology was chosen. This method structured subjective opinions and revealed common viewpoints through factor analysis, providing a foundation for the systematic study of subjectivity and viewpoints about climate change (Brown 1992). Selecting Q-Methodology was helpful to expose various meanings associated with climate change.

The research design comprised four stages. The first one referred to the literature review, where results were used to elaborate on the theoretical framework and methodological tools of the thesis. The second phase is that referring to the data collection concerning the Q-Methodology, and the third to the survey data collection. Here, the study was for measuring hypothesized predictors of climate change perception and related dimensions. The last phase concerns the data analysis. Figure 4-1 below describes the research phases.

Figure 4-1 Research phases in the research



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Source Own elaboration

Table 4-1 summarizes the research stages and the characteristics of data type and modes of data collection and analysis. Field research was carried out in June/July in 2014; the data collection was for both cases primary.

Table 4-1 Data collection characteristics

STAGE	DATA TYPE	MODE OF DATA COLLECTION	MODE OF ANALYSIS
2	Quantitative: (Survey research in June/July 2014)	Primary: data from survey with people from Santiago Comaltepec (Mexico) and Consejos Comunitarios (Calima and Dagua (Colombia)	Quantitative analysis combined with network analysis
3	Quantitative and Qualitative: (Q-Methodology in June/July 2014)	Primary: data from Q-sorting procedures with people from Santiago Comaltepec (Mexico) and Calima and Dagua (Colombia)	Quantitative and qualitative analysis. PCA combined with a description of perceptions.

4.2 The Literature review

Throughout the literature review, the theoretical foundations of the research were laid. The literature review started in April 2012 and lasted until the end of the study. According to the purpose of the study, the process of literature reviewing was divided into two phases. The first one aimed at defining the theoretical framework of the thesis. With the second, methodological tools were identified.

In the first part of the literature review, the primary goal was to focus on the analysis of climate change from a social perspective. To understand dimensions of climate change and international view on the topic, scientific journals, articles, books, international reports, and work documents were reviewed. Here, aspects concerning basic concepts of climate change, risk, the sociological theory of risk and environmental psychology were addressed. The basics of sociology and constructivism were considered to approach the social and cultural vision of climate change. This laid the foundations of the thesis social approach to climate change. In order to understand the interplay between individuals and environment, the literature review also included aspects concerning environmental psychology, environmental influences on human behaviour, and factors affecting and encouraging a pro-environmental behaviour. The results of this exploration phase have been presented into the second chapter of the thesis.

Likewise, the literature review focused on the choice and design of the methodological tools. From this process, the survey method and the Q-Methodology were identified as the appropriate instruments to meet the thesis objectives.

Climate change and risk perception studies have traditionally used a survey-based methodology. Using Q-Methodology, qualitative and subjective aspects of climate change perception can be explored. Q-Methodology is an appropriate choice to explore various perspectives within a group (Ramlo 2008).

4.3 Q-Methodology as a method for exploring subjectivity behind climate change perception

4.3.1 Rationale for Q-Methodology

Stephenson proposed Q-Methodology in 1935 as a methodological tool to better understand human behaviour. This method structures subjective opinions and reveals

common viewpoints through factor analysis, providing a foundation for the systematic study of subjectivity, viewpoints, attitudes, or beliefs (Brown 1992).

Most of its application has been in psychology research (Stephenson 1953), health fields (Thomson and Baker 2008, Baker et al. 2013) and emotions (Watts and Stenner 2005). Recently, it has been used in risk perception studies by O'Neill and Nicholson-Cole (2009) and O'Neill et al., (2013), and in climate change and environment-related matters (Barry and Proops 1999, Wolf 2014, Bacher et al. 2014, Albizua and Zografos 2014, Forrester et al. 2015). It is also recognised as an appropriate tool for rural social research (Previte et al. 2007). Few studies of Q-Methodology were found in the context of CBNRM and common pool resources in Europe and Latin America (Gruber 2011, Rodriguez-Piñeros et al. 2011, Baur et al. 2014). Due to the particular characteristics of local communities, Q-Methodology was considered an appropriate technique for CBNRM contexts.

4.3.2 Q-Methodology: a brief introduction

For the sake of clarity, a brief theoretical explanation about Q-Methodology is introduced in the following sections. After this and following the same structure, the process of applying Q-Methodology is explained. To enable the understanding of how Q-Methodology operates, definitions of Q-Methodology terms are provided in Table 4-2.

Commonly, a Q-Method study has a sequence of five phases where the researcher organises, collects and analyses information (du Plessis 2005, McKeown and Thomas 2013). However, for some authors the methodology is structured in fewer stages (Brown 2004).In the first stage the researcher collects the discourse and selects the sample of statements. In the second and third phase the selected participants are required to sort the statements (Q-sorting). Finally, the sorting of statements is compared through factor analysis, and results are analysed to find tendencies in the discourse. For this research, Q-Methodology was structured in five stages

Table 4-2 Terminology for Q-Methodology

CONCEPT	DEFINITION
The concourse	The discourse on a particular topic that is frequently based on opinions. It is composed by statements or pictures referring to that particular topic
Q-sorting	The process by which participants select statements in their preferred selected order
Q-sort cards	Pictures/cards including statements that will need to be arranged by participants. If pictures are replaced by statements, the researcher needs to be sure to write one statement per card in audience´s familiar language
Q-sort deck	The total set of cards or images that will be used in the study
Rating Scale	The measurement of preferences. Typically rated on a grade scale of -5 to +5, sometimes may vary from -4 to +4 or -3 to +3, depending on the items in the study
Condition of instruction	A guide for participants to fill in and complete for Q-sorting
Q-Sample	The set of Q-sort cards selected and included for the study
Person-sample (p-set)	Participants selected from the people involved in the discourse to sort selected pictures or statements about the concourse
Q-sort	The result of the sorting activity undertaken by each participant. It represents each unique arrangement of the sorted statements based on the condition of instruction, from members' viewpoints
Score sheet	Q-sort diagrams for each participant that includes the number of the placement in such a way to be recorded for data analysis
Sorting grid	A quasi-normal distribution grid, (numbered from a negative to a positive value), containing the same number of placement spots as the number of Q-sample statements.
Factor Array	A reconfigured Q-sort based on the composite and weighted z-scores from all the participants who define a particular factor. A factor array characterizes a person who would load 100% on that factor
Distinguishing statements	Statement(s) placed in the sorting grid in a statistically significant different position compared with all other factors
Consensus statements	Statement(s) placed in the sorting grid in a statistically significant similar position compared with all other factors

Source Own elaboration from Plessis 2005, Watts and Stenner 2012, and Paige 2015

4.3.2.1 Collecting and exploring the concourse

The first step is to explore the concourse and to generate a series of statements related to the topic. The concourse includes a set of concepts, ideas referred to the issue domain in the study. It might not be restricted to words and it can include pictures as well (O'Neill et al., 2013; O'Neill and Nicholson-Cole, 2009). Commonly, the concourse is obtained from personal interviews with the respondents, depending on the criteria of the researchers and the availability of participants for interacting. Primary sources include interviews, group discussions or focus groups. This Q-sample type is called naturalistic. The statement set can also be developed from secondary sources (Barry and Proops 1999, McKeown and Thomas 2013), including photographs, newspaper articles, literature reviews or editorials (McKeown et al. 1999). Secondary sources or ready-made Q samples are not the standard option but help avoid overly constrained viewpoints (McKeown and Thomas 2013).

4.3.2.2 Selecting items and people

Once the statements about a particular topic (concourse) have been selected, they should be presented in a smaller universe (Brown 1980). The researcher thus faces the challenge of compiling statements that are more or less representative of the concourse (Brown 1980). These give a way to the researcher to be clear about the theoretical point of view and to facilitate the selection of Q samples (Brown 1980). There are two possible ways of excluding and including items from the research: structured and unstructured Q-sample. Unstructured Q-samples include statements presumed to be relevant to the topic at hand and are chosen without excessive effort to ensure coverage of all possible sub-issues (Watts and Stenner 2012). An unstructured Q-sample is inductive, as statement dimensions that guide a selection of statements are unclear prior to the statement collection.

However, some topical aspects either might be under- or over-sampled. Hence, a bias could be unintentionally incorporated into the final Q-sample (McKeown and Thomas 2013). As opposition, structured Q-samples are composed and gathered systematically as the researcher clusters statements according to categories and levels. The structure is achieved by applying Fisher's (1960) methods of experimental design to samples (factorial variant design and maximum likelihood estimation). Here, statements are conceptualised theoretically (Brown 1980) and cover each of the combinations to make it representative (du Plessis 2005). The researcher also covers different aspects of the same statements to make them more or less representative of the concourse (Brown 1992). Either way, Q-samples should at least have a minimum structure to facilitate the Q-sort process (Brown 1992).

Ideally, the number of Q-sort decks should not exceed 70, but it might depend on the researcher's criteria (McKeown and Thomas 2013). Barry and Proops (1999) point out that the Q-sort deck may vary between 30 and 100 cards; other studies use cards from a range of 49 to 70 statements (Cuppen et al. 2010). Kline established, a minimum ratio of one participant to every two variables (statements) is needed to determine the number of respondents (Kline 1994 as cited in Watts and Stenner 2012). In any case, the number of Q-sort cards should not overwhelm participants, and the Q-sorting process should not be too time-consuming. A friendly drafting is necessary for the participants, trying to avoid double-negations and extreme sentences. As might seem obvious, each card should include just one statement, photograph, or word.

4.3.2.3 Sampling people or P-set

The strategy for selecting participants should ensure as much diversity as possible in categories of thoughts and ways to look at an issue. In Q-Methodology, participants are chosen with the idea of representing different views on a topic. The researcher may either sample strategically or act against opportunity sampling according to their needs (Watts and Stenner 2012). Although both ways are legitimate, and availability of people could be used as one criterion (McKeown and Thomas 2013), the latter might alter results. Researchers should avoid opportunity and random choice. A good participant in a Q-methodology study should reveal the subjective dimensions researchers look for, either for their interest in the topic or the disinterest about it. In any case, a sufficient set of variables (in Q-Methodology people are considered to be variables) and categories of thoughts are required.

There is not a fixed or ideal number of participants in a Q-study, although variability must be guaranteed, to capture enough range of thoughts, beliefs, and viewpoints. Some authors (Valenta and Wigger 1997, Brown 2004, Wolf 2005, Watts and Stenner 2012) suggest working with a smaller number of participants in relation to the items in the Q-set.

4.3.2.4 The Q-sorting

The Q-sorting process calls for ranking a set of incentives according to an explicit rule/ condition of instruction, usually with scale scores provided to assist the participant in thinking about the task. More often, Q-sorting is done in the presence of the researcher, as accompanying the participant is helpful to avoid confusion. Data may be gathered by mail or the internet too. Researchers should be careful and meticulous when giving instructions in this case (Watts and Stenner 2012).

The Q-sorting is a synthesis operation in which the person express their preferences (McKeown and Thomas 2013). The action of Q-sorting is subjective as participants sort the cards from their point of view (Brown 1980).

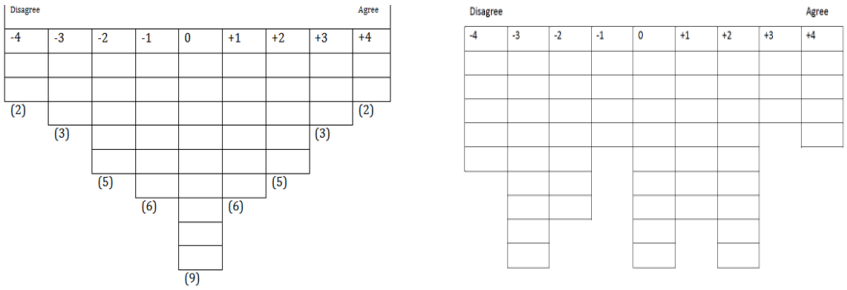
The Q-sample is administered to each participant who then evaluates each item, according to individual perception. For administering the Q-sort, participants are often given a sheet with particular sorting instructions. The condition of instruction is a simple sentence explaining how the participant should proceed in the Q-sorting process. It is in the researcher's interest to decide whether to use a forced-choice or a free sort condition of instruction or distribution (du Plessis 2005). A forced-choice condition of instruction expects the participant to place the cards on a fixed number of columns in the Q-sort sheet answer. The researcher may ask participants first to familiarize themselves with the cards

and then organize them into three different columns according to the level of the agreement, neutral feeling or disagreement they experience when reading them. Accordingly, the cards will be organized in three piles from right to left (Figure 4-2)

In a free-sort condition of instruction, the participant is allowed to place as many cards as he or she decides in every column. The researcher does not force the way the reader understands the ideas on each card.

The way the participant experiences the exercise differs from one way of sorting to the other. While forcing the participant to place the cards in particular locations may be restrictive and could thwart the participant's ability to express subjectivity, the statement sorting will be more stable.

Figure 4-2 Forced-Choice versus free-sort distribution



Forced-choice distribution Free-sort distribution

Source Own elaboration from du Plessis 2005, Watts & Stenner, 2012

4.3.2.5 Analysing data: Q-sort

Q-Methodology seeks for similarities among the card patterns arranged by the respondents; clustering people's thinking or perceiving in a "similar" way (van Exel and de Graaf 2008). After Q-sorting, the researcher should gather all information and then compare the arrangements of the statements. Using factor analysis, the researcher finds homogeneous groups of variables resulting in factors (which in Q-Methodology will correspond to categories of thoughts). From factor analysis, the Q-methodologist obtains a cluster of ideas, viewpoints, or beliefs, the load and weight of each item about each factor and the way each factor represents each Q-sort. There are several statistical packages to perform

the Q analysis, such as SPSS or a dedicated Q package such as QMethod-2.11d[4] and the recently developed Q-method package for R (Zabala 2014).

The Q factor analysis operates in the same way as factor analysis. First, it calculates the correlation matrix expressing the overall variability of the statements. Correlation between each Q-sort and each factor is represented by a value from -1 to +1. In Q-method, the correlation is used as a path to go to factor analysis (Karimova 2014). Then it extracts the optimal number of factors (which in Q are clusters of thoughts). Factors which have eigenvalues higher than 1.00 are extracted. Several studies recommend that the ideal number of factors to be extracted should not exceed 3 or 4 (Brown 2004, du Plessis 2005, Watts and Stenner 2012, McKeown and Thomas 2013). Traditional perspectives on Q-Methodology uses centroid factor analysis, as it allows the researcher to judgmental rotate the factors (McKeown and Thomas 2013). Recent studies suggest that Principal Component Analysis provides a trustful statistical solution (Watts and Stenner 2012). After extracting, each Q-sort will load differently to each factor this representing the way they correlate.

Finally, it rotates[5] the solution for ease of interpretation, and it estimates the dimensions. The program correlates Q-sorts to identify a small number of factors that can represent shared forms of understandings among participants.

Some significant differences between Q-Methodology and conventional factor analysis need be considered. The most important one is the unit of analysis. The Q-Method describes a population of viewpoints, while conventional factor analysis describes population of people (Paige 2015). In addition, the unit of analysis differs between Q-Methodology and Factor Analysis. In the first, statements are the unit of analysis, while in the latter the unit of analysis is people. Q-Methodology does not need a great number of items (viewpoints) to determine the difference among people, as a limited number of people are given a large number of variables (statements). However, in typical factor analysis a large number of people are given a small number of variables. A fourth major

[4] Available at http://www.rz.unibw muenchen.de/p41bsmk/qmethod

[5] This operation is needed to simplify the original "unrotated" matrix obtained after factor extraction. Based on statistical procedures, Plessis (2005) suggests that a factor should be taken into account for rotation depending on the significance level. In Q-factor analysis, Varimax factor rotation is normally followed by a judgmental or by hand rotation, which does not come without criticism (Brown 1993, du Plessis 2005) as the analysis may lose the objectivity gained by the statistical procedure.

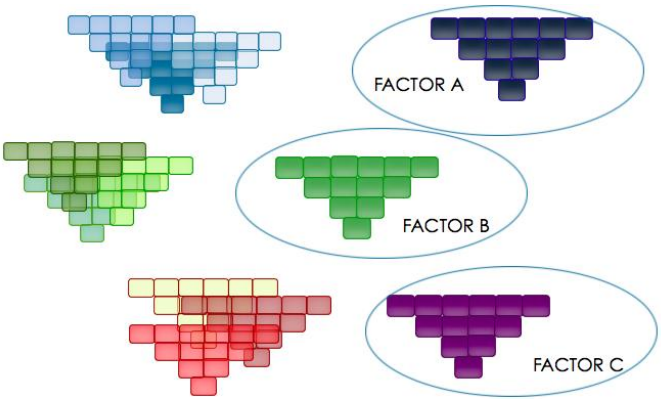
difference lies in correlations. While factor analysis seeks for correlation between variables across a sample of people, in Q-Methodology we look for by-person correlation across a sample of variables (statements).

4.3.2.6 Interpreting

Once factor scores have been computed, each factor is presented in the form of a factor array, that is, a diagram representing overall points of view.

Factors show the way items and variables tend to gather. Each factor array shows where each statement was placed on the Q-sort concerning the perception of the group. Distribution gives rise to Factor A, Factor B or Factor C Figure 4-3. At this stage, the researcher needs to find meaning in the factors. To do so, the researcher determines what the items defining each factor have in common. Interpretations are based on factor scores that reflect the extent of agreement among perceptions related to the individual Q-Sort statements. Following recommendations of Brown (1993), researchers should be interested in statements involving the integration of overall viewpoints and not as isolated and independent events.

Figure 4-3 Factor arrays in Q-Methodology



Source Own elaboration

4.3.3 About generalization of Q-Methodology

Q-Methodology works with small samples. Q- Methodology is not used with generalising purposes as other quantitative techniques that needed from large samples (Brown 1980). However, it does not mean that Q-Methodology have no wider implications. In Q-Methodology the generalization can be understood as to find in the same sample of people (p-set) similar or divergent views. Watts and Stenner (2012) mention that the generalization

in Q is based on categories and concepts driven by "semantics" and not statistics. Q-Methodology is a method to understand subjectivity and indeed subjectivity can change over time. If repeating the studies in the communities at different times then it could be identified how the "views on climate change" have differed -if so- over time. Thus, learning about which parts of the views remain constant. Stablishing the existence of different views can question prejudices in relation to a particular topic. Q- Methodology sheds light on the differences and the commonalities that would otherwise go unnoticed if the only purpose would be to generalize.

4.3.4 Doing Q-Method for exploring perception of climate change

After explaining the steps to conduct Q-Methodology study, explanations of how the Q-Method was carried out in this thesis are given.

4.3.4.1 Collecting and exploring the concourse

As previously mentioned, the first step in Q-methodology is to generate and explore the concourse and to generate a series of statements related to the topic. To fully comprehend the several dimensions of climate change phenomenon, it was important to establish the appropriate sorts. Hence, to ensure that a variety of aspects was included and to facilitate comparisons, a structured Q-sample technique was used to include and exclude statements. These were organised and specified into five climate change related categories: information and knowledge, impacts, behaviours and actions, concerns, and management. Each of the categories was divided into two and three levels and statements were classified accordingly. 3). The statement set for this research was developed from existing studies related to climate change perception (Barry and Proops 1999, Dunlap et al. 2000, Niemeyer et al. 2005, Wolf 2005, Leiserowitz 2007a). To compare and contrast results in both case studies, the statements were translated into Spanish, and native researchers proofread and adjusted the vocabulary to each local context. Eighty-one statements were initially selected. After revision, forty-one statements formed the definitive statement. Statements for the Q-Methodology are shown in Table 2 Appendix 2.

Table 4-3 Structure of the concourse

CATEGORIES	LEVELS	NUMBER OF STATEMENTS
Behaviours and actions	Preventive	10
	Local	
	Global	
Concern	Awareness	9
	Responsibility	
Management	National	6
	Local	
Impacts	Human	8
	Environment	
Information and knowledge	Level	8
	Sources	

Each Q-sort card in the study contained one individual statement. Statements were both positive and negative to avoid statements piling up on either the negative or the positive side of the Q-sort distribution. Additionally, to gather individual views, participants were asked to comment on the topic and the method at the end of the Q-sort sheet.

4.3.4.2 Selecting items and people

Considering Kline's recommendations (Kline 1994 as cited in Watts and Stenner 2012) Therefore, having the study forty-one statements, the expected number of respondents was around twenty for each case study. Participants were selected on the basis of their knowledge about the territory (researchers, natural resource managers, environmental guides, farmers, authorities) and their links to natural resource management (people living in the territory and depending on natural resources). In Consejos Comunitarios twenty-six participants (eighteen women and eight men) were asked to Q-sort the statements. In Santiago Comaltepec twenty-three participants (four women and nineteen men) completed the process.

Table 4-4 Demographic profile of respondents for Q-Methodology

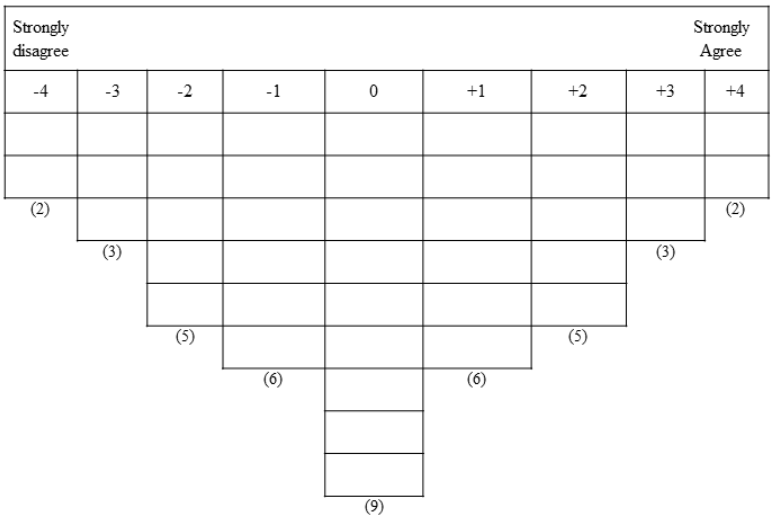
Participant	Consejos Comunitarios			Santiago Comaltepec		
	Gender	Living in the territory	Attachment	Gender	Living in the territory	Attachment
1	Female	No	Researcher	NA	Yes	Inhabitant
2	Male	Yes	Municipal authority	Male	No	Researcher
3	Female	No	Researcher	Male	No	Researcher
4	Female	No	Researcher	Male	No	Public Administration
5	Female	No	Researcher	Male	No	Researcher
6	Female	Yes	Inhabitant	Male	Yes	Officer
7	Female	Yes	Environmental officer	Female	Yes	Officer
8	Male	Yes	Environmental officer	Male	Yes	Environmental officer
9	Female	Yes	Environmental officer	Male	Yes	Environmental officer
10	Male	Yes	Environmental officer	Male	Yes	Municipal President
11	Female	Yes	Inhabitant	Male	Yes	Inhabitant
12	female	No	Environmental officer	Male	Yes	NA
13	Female	Yes	Inhabitant	Male	Yes	NA
14	Male	Yes	Inhabitant	Male	Yes	NA
15	Male	Yes	Inhabitant	Male	Yes	NA
16	Female	Yes	Inhabitant	Male	Yes	NA
17	Female	Yes	Inhabitant	Male	Yes	Municipal Authority
18	Male	Yes	Environmental officer	Female	Yes	NA
19	Female	Yes	Inhabitant	Female	Yes	NA
20	Male	Yes	(Co) researcher	Female	Yes	NA
21	Female	Yes	Inhabitant	Male	Yes	Inhabitant
22	Female	Yes	Officer	Male	Yes	Inhabitant
23	Male	Yes	Officer	Female	yes	Inhabitant
24	Female	No	Environmental officer			
25	Female	Yes	Inhabitant			
26	Male	Yes	Inhabitant			

4.3.4.3 The Q-Sorting

The statements were provided on separated and numbered cards along with a Q-sort sheet including instructions. Participants were initially asked to sort the items into three piles: agreement, disagreement, and neutral/uncertain position. Afterwards, they sorted them in a more fine-grained way using a scale ranging from -4 (strongly disagree) to +4 (strongly agree). Respondents distributed their answers according to a forced-choice frequency distribution (4), with one statement in each blank cell. An enlarged version of the Q-sort

figure was used to facilitate the Q-sorting process to help in the process. The cards were shuffled before they were given to the participants. In addition, participants delineated the extent of the three preliminary sorting categories as suggested by Watts and Stenner (2012) to see the limits of the strongly agree, to strongly disagree areas. After scoring the statements, participants were asked to comment on the topic and the method. The sorting was conducted face to face with the researcher in July 2014.

Figure 4-4 Q-sort distribution in the study



Source Own elaboration

4.3.4.4 Analysing data: Q-sort

The Q-analysis was performed in twenty-three Q-sorts in the Colombian case and twenty-one for the Mexican case. Five Q-sorts were not considered for the analysis because they were incomplete or the answers were inconsistent. Even though the exploratory characteristic in Q-Methodology lead to think that key determining factor can appear after conducting the analysis, it is possible to compare distinct groups based on a particular characteristic (Watts and Stenner 2012). There are three possible techniques being a qualitative comparison of the view emerged for each group, an intercorrelation of their respective resulting factor arrays or a second-order factor analysis with all the q-sort for the study and the factor arrays (Brown 1980, Watts and Stenner 2012)The comparison in the research were done through the qualitative option..

These Q-sorts were inter-correlated and subjected to a by-person factor analysis for each case, using PQMethod software (Schmolck and Atkinson 2002). PQMethod allows the

researcher to choose between centroid factor analysis and Principal Component Analysis (PCA). The available rotation methods were manual and varimax.

In a first attempt the analysis was performed through factor analysis via centroid extraction with the idea of bringing the best carried out by extracting four factors and then three factors. These attempts led to an interspersed empty factor situation. That is to say, in the series of unrotated centroids one of them had about zero percent explained variance, followed with one or more centroids with an acceptable amount of explained variance. Following recommendations of experts of the International Society for the Scientific Study of Subjectivity (ISSSS), the data were factor analysed using PCA.

In this process, the sorts of participants sharing perceptions were grouped together and formed a factor. In the first stage, the program extracted eight factors for each case study. The software calculated a correlation matrix of all forty-one sorts for each case, representing the level of similarity of the participant's perceptions. The correlation matrix for both cases is shown in Table 3 and Table 4 Appendix 2.

Three parameters were used to determine the appropriate number of factors to be retained. First, factors with eigenvalues higher than 1 were considered. Additionally, factors with two or more significant Q-sorts loadings at $p<.01$. For that significant level, Standard error (SE)) should be z-score 2.58 (Brown 1980). To determine which correlations were considered significant, the equation was $SE_r=1/\sqrt{N}$. N refers to the number of items for sorting (41). Hence, for the study Q-sorts significance was calculated at ±0.40 or above (Table 2 Appendix 2). This expresses the extent to which each sort agrees with a factor's viewpoint (Brown 2004). Lastly, factors meeting Humprey´s rule (as cited in Brown 1980): "a factor is significant if the cross-product of its two highest loading (ignoring the sign) exceeds twice the standard error" were considered for generating the factor.

Then the factors were varimax rotated. The purpose of rotation was to move the points to bring more definitions to factors one, two and three. Varimax rotation fits with the inductive analytic strategy of the research better than manual rotation, because there is no prior belief about the results to be obtained. It also maximizes the amount of explained study variance (Watts and Stenner 2012). Results were satisfactory enough to continue with the analysis. Three factors were extracted in both case studies. The statements for each case were merged to form a single Q-sort for each factor (factor array), representing a distinct viewpoint on climate change. In Consejos Comunitarios, the extracted three factors together explained for 56% of total variance. In Santiago Comaltepec, the percentage of total variance was 60%. Correlations between factors can be seen in Table 4-5 and Table 4-6.

Table 4-5 Consejos Comunitarios: correlation between factor scores

	1	2	3
1	1.00		
2	0.4579	1.00	
3	0.3921	0.2399	1.00

Table 4-6 Santiago Comaltepec correlations between factor scores

	1	2	3
1	1.000		
2	0.5449	1.000	
3	0.1034	0.0470	1.000

4.4 Survey Methodology

The quantitative aspect of the research was gauged through survey methodology. The primary goal for which the survey was designed, was to explore adequacy and measure predictors and determinants of climate change perception and environmental attitudes among the people users in both case studies . In the research, the survey was in line with the Tailored Design method (Dillman et al. 2014) that identified and utilized knowledge of sponsorship, the survey population, and the nature of the survey situation to maximize quality, and quantity of response (Dillman 2007). The Tailored Design was welcomed in the survey by applying the so-called mixed-method (Check and Schutt 2012, Oldendick 2012, Dillman et al. 2014). The process of selecting the procedure and the type of survey was done according to the topic, the population, and resources and time available for the study. In the process of determining the survey design, minimizing the non-response rate and the measurement error were part of the goals (Check and Schutt 2012).

From the type of survey designs (mailed survey, in-person interview, web and group survey) (Lavrakas 2008) two modes were used simultaneously for the survey data collection-mix-mode (de Leuw 2009): a self-administered questionnaire was combined with the assistance of a personal interviewer (face-to-face). Self-administered questionnaires are designed to be completed without the intervention of the researcher (Lavrakas 2008). However, for some people responding is a difficult task, as it requires effort and increases reluctance to complete it. Hence, it was considered appropriate to give some guidance to increase the response rate and ease the process of filling in the questionnaire, so the respondents had a chance to clarify if needed. The mix-mode was chosen mainly for the

subset of sensitive questions mostly related to ideology; trust in institutions and relation with nature. Strong and weak points were considered for each mode. The interviewer's presence could increase social desirability (Dillman et al. 2014). However, the response rate could be positively influenced by having an interviewer to answer questions if needed (de Leuw 2009). Next , the process of survey design is presented. First, aspects of the survey design and the items construction are included. Followed by the data input and the analysis procedures

4.4.1 Survey design

The items were chosen according to those already checked in risk and climate change perception studies and were adapted to the local context to assure scientific validity.

4.4.1.1 Sampling procedures

Due to the descriptive character of the research sampling, methods were selected combining the purposive sample (respondents were selected based on the degree of attachment to the community) with convenience sampling (sample represents the sample itself) (Leiserowitz 2003, de Vaus 2005). Key stakeholders were selected based on their ties with the territory and the management of natural resources. In the case of Consejos Comunitarios, local people trained as co-researchers by COMET-LA project were also included. The demographic profile of survey respondents is showend in Table 4-7. The table provides the data by case study. The total sample for the survey was composed of 42 men and 28 women, whose ages ranged from 17 to 35 years old. Higher educational level for Santiago Comaltepec includes people answering secondary-higher (nine participants) and a higher level of education (four participants). The sample was unbalanced in terms of gender and ideology.

Table 4-7 Demographic profile of survey respondents

			CONSEJOS COMUNITARIOS	SANTIAGO COMALTEPEC	TOTAL
GENDER	Male	Count	26	16	42
		% within Country	65.0%	53.3%	60.0%
		% of Total	37.1%	22.9%	60.0%
	Female	Count	14	14	28
		% within Country	35.0%	46.7%	40.0%
		% of Total	20.0%	20.0%	40.0%
AGE	Young	Count	17	10	27
		% within Country	42.5%	33.3%	38.6%
		% of Total	24.3%	14.3%	38.6%
	Middle-aged	Count	15	15	30
		% within Country	37.5%	50.0%	42.9%
		% of Total	21.4%	21.4%	42.9%
	Elder	Count	8	5	13
		% within Country	20.0%	16.7%	18.6%
		% of Total	11.4%	7.1%	18.6%
EDUCATIONAL LEVEL	Primary	Count	8	9	17
		% within Country	20.5%	30.0%	24.6%
		% of Total	11.6%	13.0%	24.6%
	Secondary	Count	26	7	33
		% within Country	66.7%	23.3%	47.8%
		% of Total	37.7%	10.1%	47.8%
	Higher	Count	5	14	19
		% within Country	12.8%	46.7%	27.5%
		% of Total	7.2%	20.3%	27.5%
IDEOLOGY	Left	Count	1	10	11
		% within Country	2.6%	37.0%	16.9%
		% of Total	1.5%	15.4%	16.9%
	Centre-left	Count	1	14	15
		% within Country	2.6%	51.9%	23.1%
		% of Total	1.5%	21.5%	23.1%
	Centre-right	Count	3	2	5
		% within Country	7.9%	7.4%	7.7%
		% of Total	4.6%	3.1%	7.7%
	Right	Count	5	1	6
		% within Country	13.2%	3.7%	9.2%
		% of Total	7.7%	1.5%	9.2%
	No answer	Count	28	0	28
		% within Country	73.7%	0.0%	43.1%
		% of Total	43.1%	0.0%	43.1%
ENVIRONMENTAL ORGANISATION	Yes	Count	19	2	21
		% within Country	50,0%	6,7%	30,9%
		% of Total	27,9%	2,9%	30,9%
	No	Count	19	28	47
		% within Country	50,0%	93,3%	69,1%
		% of Total	27,9%	41,2%	69,1%
OCCUPATION NATURAL RESOURCES	No	Count	15	10	25
		% within Country	38,5%	33,3%	36,2%
		% of Total	21,7%	14,5%	36,2%
		% within Country	54,5%	45,5%	100,0%

		% of Total	61,5%	66,7%	63,8%
		% within Natural Resources	34,8%	29,0%	63,8%

4.4.1.2 Questionnaire design

From the three survey techniques, interview, case study and questionnaire (de Vaus 2005, Gideon 2012) the latter was chosen as the survey instrument for the research. During the design phase the five guiding principles considered by de Vaus (2005) and Spector (2013) were followed: i) maintaining a consistent focus on what to include or exclude in the questionnaire bearing in mind the primary goals of the research, ii) achieving consistent responses through reliable questions, iii) ensuring that questions measured what they were intended to measure, iv) keeping a proper balance of response rate, v) making the questionnaire appealing. The questionnaire can be viewed in Appendix 3.

4.4.1.3 Question content

To better comprehend how people perceived climate change and to avoid ambiguity (Spector 2013), particular attention was paid to the information and variables in the study. The question content embraced different facets according to the types proposed by de Vaus (2005): behaviour, beliefs, knowledge and attributes. Variables in the study were defined accordingly. Behaviour was addressed to know what people do regarding climate change and environment. Knowledge about climate change was framed to establish the truthfulness of their beliefs. In accordance with questions about beliefs, people were asked about climate change statements, having to define them as true or false. Items were included in the questionnaire to obtain information about respondents' personal attributes. Each type of information was independently measured as suggested by Gideon (2012).

The questionnaire included thirty-seven questions with their corresponding subitems. Questions were selected after a literature review on the topic. Sources for each question can be seen in Table 4-8. Nine context specific questions concerning the relationship between people and the environment were developed specifically for this thesis (Q6, Q7, Q8, Q10, Q15, Q19, Q20, Q23, and Q25).

One of the study objectives was to check on the validity of the cultural theory of risk and the NEP scale in CBNRM contexts. For that purpose, adjustments and adaptation of the cultural theory (Q12 and Q13 and from the new environmental paradigm (Q11) were made. Item adaptations are described in the following sections.

Considering the content and the object of measurement, questions were organized into three groups:

- Personal attributes: gender (Q1), age (Q2), level of education (Q3), ideology and views on institutions (Q35, Q36, and Q37), items related to living area (Q4, Q5, Q6, Q10, and Q18), issues related to livelihood activities and conditions (Q7, Q8, and Q9).
- People and the environment: cultural theory (Q12 and Q13), general environmental attitudes and behaviour (Q14, Q15, Q16, Q17, and Q23) and new environmental paradigm attitudes (Q11).
- Climate change related issues: knowledge about climate change causes, impacts and solutions (Q19, Q20, Q21, Q22, Q24, Q25, Q26, Q27, and Q28), and information about climate change (Q29, Q30, Q31, Q32, Q33, and Q34).

4.4.1.4 Selecting question type and responses

Along with the question content, determining the response format was equally important. Deciding on whether to include a close-ended or an open-ended format depends on how variables are constructed, the literature available and previous research on the topic (Gideon, 2012).

In the questionnaire, due to questions content and type of respondents, the majority of the questions had a closed-ended format that guarantees exclusiveness and exhaustiveness (there was enough variety of response alternatives, and answers were mutually exclusive). Additionally, three open-ended questions related to how respondents understand climate change, description of their livelihoods, and changes in their environment were included. Participants were given the option of non-exclusive responses only for questions related to sources of information about climate change.

Table 4-8 shows the type of question and response format for each question.

According to Jenkins and Dillman (1997) motivation is a crucial factor to make people respond to questionnaires and increase the response rate. Motivation starts with a good understanding of the questions, which in face-to-face interviews is an easier task than in self-administered questionnaires. As a process of social exchange, motivation is subject to rewards, costs, and trust. Bearing this in mind and to increase motivation Dillman's (2007) recommendations were followed. For instance, the help of the respondents was appreciated at both the beginning and end of the questionnaire (rewards). The questionnaire was designed as attractively as possible regarding layout and salience of the topic to reduce social costs (climate change was a relevant issue in the communities daily life) (Escalante Semerena et al. 2012, Farah. et al. 2012). Complex questions and artificial

language were eluded when possible to avoid embarrassment. Furthermore, personal questions (age, gender, education) were minimized. Ideology items were left for the end of the questionnaire and respondents were given a *Don't know/No answer option.*

Generating trust was not a burdensome issue since the research was part of a broader project where structures of trust and credibility were built throughout the project. This enabled the study to reach out to community members. Also the institutions concerned and the third persons delivering the questionnaire were legitimate as they were also part of the communities.

4.4.1.5 Question ordering

The questionnaire began with items related to personal factors to help respondents establish comfort and interest. Questions and items were randomized and rotated within blocks to prevent satisficing (Jenkins and Dillman,1997). The first group of questions gathered information on socio-demographic elements. Following, respondents were asked about how they relate to nature. The third block consisted of visions and issues related to climate change. In the questionnaire, there was enough space for answering both open-ended and closed-ended questions. Wherever convenient, instructions were included to facilitate the flow of the questionnaire.

Table 4-8 Overview of questionnaire information

QUESTIONS CONTENT		QUESTION NUMBER	SOURCE	TYPE OF QUESTION	RESPONSE FORMAT
PERSONAL ATTRIBUTES					
	Gender	Q1	Own elaboration	Closed-ended question	Binary choice-dichotomous
	Age	Q2	Own elaboration	Open-ended question	Asking for verbatim
	Level of education	Q3	Own elaboration	Closed-ended question	One/Multiple choice (between nominal categories)
	Items related to are of living	Q4	Own elaboration	Open-ended question	Asking for verbatim
		Q5	Own elaboration	Open-ended question	Asking for verbatim
		Q6	Own elaboration	Closed-ended question	Binary choice-dichotomous
		Q10	Own elaboration	Closed-ended question	Rating Likert scale
		Q18	Own elaboration	Open-ended question	Asking for verbatim
	Livelihood activities and conditions	Q7	Own elaboration	Closed-ended question	Binary choice-dichotomous
		Q8	Own elaboration	Open-ended question	Asking for verbatim
		Q9	Own	Closed-ended	Binary choice-

QUESTIONS CONTENT		QUESTION NUMBER	SOURCE	TYPE OF QUESTION	RESPONSE FORMAT
			elaboration	question	dichotomous
	Ideology and views on institutions	Q35	Own elaboration	Closed-ended question	Rating Likert scale
		Q36	Own elaboration	Closed-ended question	Rating Likert scale
		Q37	Own elaboration	Closed-ended question	Rating Likert scale
PEOPLE AND THE ENVIRONMENT					
	New environmental paradigm	Q11	(Dunlap and Liere 1978, Dunlap et al. 2000)	Closed-ended question	Rating Likert scale
	Cultural theory	Q12, Q13	(Wildavsky and Dake 1990, Brenot et al. 1998, Marris et al. 1998).	Closed-ended question	Rating Likert scale
	General environmental attitudes and behaviour	Q14	(Oregon Survey Research Laboratory et al. 2002) (OASIS)	Closed-ended question	Binary choice-dichotomous
		Q15	Own elaboration	Closed-ended question	One/Multiple choice (between nominal categories)
		Q16	(Oregon Survey Research Laboratory et al. 2002) (OASIS)	Closed-ended question	Binary choice-dichotomous
		Q17	(Oregon Survey Research Laboratory et al. 2002) (OASIS)	Closed-ended question	One/Multiple choice (between nominal categories)
		Q23	Own elaboration	Closed-ended question	One/Multiple choice (between nominal categories)
CLIMATE CHANGE RELATED ISSUES					
	Knowledge about climate change and the environment	Q19	Own elaboration	Closed-ended question	Binary choice-dichotomous
		Q20	Own elaboration	Open-ended question	Asking for verbatim
		Q21	(Leiserowitz 2003, Malka et al. 2009)	Closed-ended question	Rating Likert scale
		Q22	(Leiserowitz et al. 2011)	Closed-ended question	One/Multiple choice (between ordered attitude statements)
		Q24	(Leiserowitz et al. 2011)	Closed-ended question	Rating Likert scale
		Q25	Own elaboration	Closed-ended question	Rating Likert scale

QUESTIONS CONTENT		QUESTION NUMBER	SOURCE	TYPE OF QUESTION	RESPONSE FORMAT
		Q26	Leiserowitz 2003; Spence et al. 2012	Closed-ended question	Rating Likert scale
		Q27	Leiserowitz et al. 2011	Closed-ended question	One/Multiple choice (between ordered attitude statements)
		Q28	Leiserowitz et al. 2011; Spence et al., 2012	Closed-ended question	Unordered response set/ Running prompt
	Level of concern and information	Q29	Leiserowitz et al. 2011	Closed-ended question	Rating Likert scale
		Q30	Leiserowitz et al. 2011	Closed-ended question	One/Multiple choice (between ordered attitude statements)
		Q31	Leiserowitz et al. 2011	Closed-ended question	One/Multiple choice (between nominal categories)
		Q32	Oregon Survey Research Laboratory et al. 2001 (OASIS)	Closed-ended question	One/Multiple choice (between nominal categories)
		Q33	Oregon Survey Research Laboratory et al. 2001 (OASIS)	Closed-ended question	Rating Likert scale
		Q34	Leiserowitz et al. 2011	Closed-ended question	One/Multiple choice (between ordered attitude statements)

4.4.1.6 Piloting, survey proofreading

On November 2013, the questionnaire was first piloted with twenty-two people, both scientists and lay population recruited from the University of Córdoba and the local area. Volunteers were informed that results were only used to improve the content and prepare the questionnaire for a second pilot stage. Respondents were asked to complete the questionnaire just as would be expected of people during the data collection. The aim of the first piloting was to ensure reasonable timing. They were asked about clarity of instructions, question wording, response options, understanding, and ease and difficulties of responding to the various items, minimizing effects on response rates. It is a common assumption that a lengthy questionnaire could increase the reluctance of people to participate and enhance the number of non-responses. From this stage, the number of the question was reduced from forty-two to thirty-seven. The five erased captured the same ideas as others; in consequence, they were merged with other questions.

4.4.1.7 Cross-cultural adaptation and translation

Applying questions specifically designed for other contexts required a process of translation and adaptation to produce equivalence on the content between the source and the target (Beaton et al. 2000). A concerted effort was placed on the items related to cultural theory (Q12 and Q13) and the NEP (Q11). In both cases, the scales were originally developed to be applied in a Western cultural context. Full account of cultural, linguistic and social differences were taken among the case studies to reduce the risk of introducing bias (van de Vijver and Hambleton 1996). Following Gjersing et al. (2010) the cross-cultural adaptation process consisted of five stages as follow:

- Conceptual and item equivalence checking: literature reviewing to insure items and concepts are relevant to the population.
- Original instrument translation: initial translations from the items were done into the language of target population (from English to Spanish).
- Back translation: back translating the Spanish version of the survey by an official English translator with a good understanding of Spanish.
- Pre-test and revision: it was assessed if ideas, words or several words reflected the same ideas as the original one.
- Final instrument elaboration: an anthropologist revised the adequacy of the vocabulary used. Additionally, native researchers and people from the communities proofread and adjusted the vocabulary to each local context (Mexico and Colombia) to guarantee a correct understanding by local communities. To improve the accuracy of the translation/back-translation process and to identify problematic issues in the instrument for communities, a group of people participated in the revision process. Their background combined expertise in environment-related issues, anthropology and local contextual knowledge.

4.4.1.8 Ethics and data collection

The ethical responsibilities covered the design and data collecting stage from the research (Oldendick 2012). Participation was voluntary, and participants were over 18. Respondents were given all the facts needed to provide informed consent: research procedures and purposes, the character of the research and how the data was going to be used. Survey participants were assured that their answers were confidential because some questions were related to personal information, behaviours and attitudes and were administered by third parties. Questionnaires were going to be returned directly to the researcher. Similarly, it was

clear to them that they were free not to answer questions they did not want to. In every stage of the process, the ethical guidelines were the same as for COMET-LA project.

4.4.2 Items construction

The survey was structured and items were ordered to prevent anticipated answers, and to avoid people feeling pressured to offer responses when they truly had none. Although participants could end up by selecting the option automatically, respondents were given the option of saying they have no opinion on items that were sensible and could increase conflicting feeling. For each question, the items were numbered consecutively.

4.4.2.1 Sociodemographics

Sociodemographic items included age, gender, educational level, and ideology. Items were used as independent variables to perform analysis regarding cultural bias (cultural theory), environmental attitudes (NEP), the level of concern about climate change, and importance to climate change.

4.4.2.2 Psychometric paradigm and risk characteristics

The perception of climate change risk was quantitatively measured from the psychometric paradigm, as people expressed quantitative judgements of risk situations. From the risk characteristics proposed by Fischhoff et al. (1978) and Slovic et al. (1982), the questionnaire measured the "catastrophic potential" (Q25), "harm to future generations" (Q26.7), "lack of knowledge to those exposed" (Q29), and "lack of knowledge to scientists" (Q34.2, Q34.3, Q34.4). The questions were not identical to the original ones in Slovic (1985). In the original study, every risk characteristic was measured on a seven-point scale. For this thesis immediacy of the effect was measured on a five-point scale where each point of the scale represented a delayed point of time. Also, harm to future generations and catastrophic potential were measured in a four point scale (*Not at all agree* to *Strongly Agree*/*Not at all* to *a lot* for each of the variables*)*. To operationalise catastrophic potential an index was created with the mean score of effects of climate change.

The lack of knowledge to those exposed was measured on a four-point scale (*Not at all informed* to *very well inform*). Lack of knowledge to scientists was measured in a multiple choice answer; respondents selected a response related to the level of knowledge of scientists on causes and consequences of climate change.

The survey items were used to study the correlation between cultural biases and the scores given to the four risk characteristics (see literature review), and the relation between the importance given to climate change and risk perception characteristics.

4.4.2.3 Cultural theory items

Cultural theory was used to explore cultural bias and worldviews. The items were adapted from different studies keeping the original basis from Douglas´ and Wildavsky´s typology (1982): individualism, egalitarianism, fatalism and hierarchism. Despite not being considered to predict behaviours related to climate change (Pendergraft 1998, Capstick 2012) and not found to be existing in people from similar contexts to CBNRM (Meader 2002), fatalism bias was found to be worth studying to comply with the objectives of the thesis and test the cultural theory in CBNRM contexts. Twenty-two items were included in the questionnaire. Participants were asked to rate the level of agreement and disagreement on a four-point scale (*Not at all agree* to *Strongly agree)*; non-committal options were included as many of the items could be sensible to respondents. Table 4-9 shows cultural items in the questionnaire, displayed by cultural typology with the correspondent number in the questionnaire. Statements are presented in Spanish as in the questionnaire and the corresponding English original version.

Table 4-9 Cultural bias items used in the questionnaire

	SPANISH ITEM AS IN THE QUESTIONNAIRE	ORIGINAL ENGLISH ITEM
QUESTIONNAIRE ITEM	IGUALITARISMO	EGALITARIANISM
Q13.5	Si las personas en este país fueran tratadas de forma más equitativa tendríamos menos problemas	If people in this country were treated more equally, we would have fewer problems
Q13.6	Aquellos que prosperan deberían pagar más impuestos para apoyar a los más desfavorecidos	Those who get ahead should be taxed more to support the less fortunate
Q13.7	La diferencia entre países ricos y pobres es injusta	The difference between rich and poor nations is not right
Q13.8	El racismo es un problema serio en nuestra sociedad	Racial discrimination is a very serious problem in our society
Q13.9	Colombia/Mexico necesita un cambio radical para distribuir su riqueza de forma más justa	What this country needs is a "fairness revolution" to make the distribution of good more equal
Q13.10	El gobierno debería asegurar que todos los ciudadanos tengan un buen nivel de vida	The government should make sure everyone has a good standard of living
	FATALISMO	FATALISM
Q12.11	Pocas veces cooperar con otras personas de mi comunidad es positivo	Cooperating with others rarely works
Q12.12	La gente a menudo me trata de forma injusta	I have often been treated unfairly
Q13.1	Creo que ser desconfiado es la mejor actitud para relacionarme con la gente	A person is better off if he or she does not trust anyone
Q13.2	No le presto demasiada atención a la política porque no tengo mucha influencia sobre las cosas	I do not worry too much about politics because I cannot influence things very much
Q13.3	No merece la pena hacer cosas por los demás	There is no use in doing things for people- you only get in the neck in the long run
Q13.4	El futuro es demasiado incierto como para hacer planes	The future is too uncertain for a person to make serious plan
	INDIVIDUALISMO	INDIVIDUALISM
Q12.1	En un sistema justo la gente más formada debería ganar más	In a fair system people with more ability should earn more
Q12.2	En este país las personas más capacitadas deberían poder acceder a los puestos más altos	In this country, the brightest should make it to the top
Q12.3	Es justo que quienes se esfuerzan más tengan más éxito en la vida	It is just as well that life tends to sort out those who try harder from those who do not
Q12.4	Las ayudas del Estado paralizan la iniciativa individual	The welfare state tends to destroy individual initiative
Q12.5	Si una persona tiene la energía y ambición necesarias para enriquecerse, debería tener derecho a hacerlo	If a person has the get-up-and-go to acquire wealth, that person should have the right to enjoy it
	JERARQUÍA	HIERARCHY
Q12.6	Pienso que debería haber más disciplina entre los jóvenes de hoy en día	I think there should be more discipline in the youth of today

Q12.7	Soy mucho más estricto que la mayoría de las personas cuando pienso en lo que está bien o mal	I am more strict than most people about what is right and wrong
Q12.8	Valoro fuertemente las rutinas	I value regular routines highly
Q12.9	Ser puntual es muy importante	I think being on time is very important
Q12.10	Las personas deberían ser recompensadas según su posición en la sociedad	People should be rewarded according to their position in society

4.4.2.4 New Environmental Paradigm items

The NEP scale was used to measure environmental attitudes. The decision was made to include 14 items (Table 4-10), derived from the NEP revision of Dunlap and colleagues (2000), randomly numbered in the questionnaire. The scale was composed of items referring to the DSP at one edge and statements of NEP at the other edge. The NEP scale was originally designed to connect different facets, but empirically it was treated as one single measurement (Catton Jr. and Dunlap 1978, Dunlap et al. 2000). There are many studies that have found that all items are loaded on one single factor, whereas others found three dimensions of factors (Hawcroft and Milfont 2010b). For this thesis, one factor was used as in the original study.

Scores were given on a four-point scales anchored by *Not at all agree* to *Strongly agree*. The *Don´t know/No answer* option was included. Seven of the fourteen scale items were worded, so a "disagree" response was environmentally positive for items Q11.1, Q11.4, Q11.5, Q11.7, Q11.9, Q11.10, Q11 and Q14. The negative statements had their polarity reversed for the analysis. Statements in the questionnaire tap each of the five facets of the ecological worldview (Dunlap et al. 2000): rejection of exemptionalism (Q11.9, Q11.12), the fragility of nature´s balance (Q11.2, Q11.4, Q11.7), the possibility of an ecocrisis (Q11.3, Q11.6, Q11.10), the reality of limits to growth (Q11.8, Q11.13, Q11.14) and antianthropocentrism (Q11.1, Q11.5, Q11.11).

After the back-translation process, some items were slightly modified from the original wording (Dunlap, 2000). Item 7 (Q11.7) in the questionnaire was originally designed to capture a NEP perspective; after rewording it the item exemplified a DSP perspective. To facilitate comprehension and reduce numbers of missing values, item 9 (Q11.9) in the scale was positively worded stating that people were able to make the earth a livable place. The item "The so-called ecological crisis facing humankind has been greatly exaggerated" item was not included in the questionnaire (corresponding to item 10 in the version of Dunlap and colleagues (2000).

Table 4-10 Dimensions and statements distribution of the NEP scale in the questionnaire

Paradigm Indicator	Facets	Original English statement	Spanish statement	Item on questionnaire
DSP	*Human domination over nature*	Humans have the right to modify the natural environment to suit their needs	Las personas tienen el derecho de modificar el medioambiente para responder a sus necesidades	1
DSP	*Human domination over nature*	Humans were meant to rule over the rest of nature	Los seres humanos fueron creados para gobernar sobre el resto de la naturaleza	5
NEP	*Human domination over nature*	Plants and animals have as much right as humans to exist	Las plantas y los animales tiene el mismo derecho que los hombres a existir	11
DSP	*Human exemptionalism*	Human ingenuity will insure that we do not make the earth unlivable	El ser humano puede garantizar que la tierra sea un lugar habitable	9
NEP	*Human exemptionalism*	* Despite our special abilities humans are still subject to the laws of nature	El ser humano está sometido a las leyes de la naturaleza	12
DSP	*Human exemptionalism*	The Earth has plenty of natural resources if we just learn how to develop them	La tierra tiene muchos recursos naturales y el hombre debe usarlos libremente	10
NEP	*Balance of nature*	When humans interfere with nature it often produces disastrous consequences	Cuando los seres humanos interfieren en la naturaleza a menudo se producen consecuencias desastrosas	2
DSP	*Balance of nature*	The balance of nature is strong enough to cope with the impacts of modern industrial nations	La naturaleza puede soportar el impacto de la actividad de las industrias	4
NEP	*Balance of nature*	The balance of nature is very delicate and easily upset	La naturaleza se adapta fácilmente y se recuperará de cualquier daño causado por las personas	7
NEP	*The risk of an ecocrisis*	Humans are severely abusing the environment	Los seres humanos abusan de la naturaleza	3
NEP	*The risk of an ecocrisis*	If things continue on their present course, we will soon experience a major ecological catastrophe	Si las cosas continúan como hasta ahora, pronto experimentaremos una catástrofe ecológica	6
NEP	*Limits to growth*	We are approaching the limit of the number of people the earth can support	En la tierra viven más personas de las que deberían vivir	8
DSP	*Limits to growth*	Humans will eventually learn enough about how nature works to be able to control it	En el futuro el ser humano aprenderá sobre la naturaleza y la dominará	14
NEP	*Limits to growth*	The earth is like a spaceship with very limited room and resources	La Tierra tiene recursos muy limitados para todos los seres humanos	13

Source Own elaboration from Dunlap et al., 2000

4.4.2.5 Behaviour changes and environmental attitudes

Questions Q14, Q15, Q16, Q17, Q23, and Q24 addressed questions related to mental dispositions to evaluate the role of institutions in climate change issues and environmental behaviours, and goal-directed pro-environmental behaviour issues (Kollmuss and Agyeman 2002). Q27 addressed percieved efficacy of people's behaviour to deal with climate change.

Results of the analysis of environmental behaviours, and attitudes were meant to complete the demographic profile of respondents; the results obtained from the NEP scale and cultural theory scales analysis. More specifically, Fisher's exact test was performed to check on the association between sociodemographic factors and people thinking about the impact on nature when buying products (Q14), willingness to change behaviour (Q23) was examined using the NEP scale, and association between socio-demographic factors and people's perception of the role of authorities in helping them to behave sustainably (Q15).

4.4.2.6 Level of concern, information, knowledge of climate change

Measures of the self-reported level of information about climate change effects and impacts (Q25, Q26, and Q27) and confidence in sources of information were included in the questionnaire (Q29, Q30, Q31, Q32, Q33, and Q34). These are shown to be important factors in climate change perception studies (Capstick 2012), being part of the risk perception dimensions. The questionnaire also included Q21 and Q22, with the idea of understanding the extent with which a person was concerned about climate change. Items about the level of concern and level of information were subject to descriptive statistical analysis, and they were examined on the basis of cultural theory biases.

4.4.2.7 The psychological distances and uncertainty and scepticism of climate change

Climate change effects were contextualized measuring psychological distance and temporal discounting (Spence et al. 2012) in Q26 on a four-point scale (*Not at all* to *A lot*). Given the high correlation between dimensions of social psychological distance, a scale was created by combining social and geographical dimensions of climate change scores means. For this purpose, the items were reversed and recoded, so that higher levels indicated greater psychological distance. Additionally, Principal Component Analysis (PCA) was performed to measure social and geographical perceived distance. Correlation and regression analysis was excuted, resulting in checking relation of importance attached to climate change and concern about depletion of natural resources Psychological distance was not predicted to be significantly associated with CBNRM contexts.

Level of scepticism was measured using three main ideas (Leiserowitz 2003): disbelief that climate change poses a threat (Q25, Q26), climate change is seen as natural phenomenon (Q22.3), and doubt on what science says of climate change (Q34). Descriptive analysis was used to analyse data about uncertainty and scepticism.

4.4.2.8 Definition of climate change

Prior to providing a definition, respondents were asked about changes in the environment (Q18), and if they have ever heard about climate change (Q19). Then, people were asked for the definition and their personal understanding of climate change. It was an open-ended question (Q20), where respondents gave their own description of climate change.

4.4.3 Data input and analysis procedures

A fundamental aim of a research is to be able to generalise results either as statistically generalisations or as replications (de Vaus, 2005). Normally while statistics are used to analyse the relationship between variables, this research is not only defined by the techniques (Hartley 1994) but also by theoretical orientation. Here they are used to understanding how climate change perception is pictured in the two case studies. In this thesis the understanding of climate change perception within CBNRM contexts and people by depending on natural resources it is more important than the establishment of statistically significant results.

The survey data was of both quantitative and qualitative nature. Therefore, the data analysis was done accordingly. Quantitative data were processed using SPSS. Additionally, as the level of missing values was under 10%, wherever possible the data was substituted by the variable mean. Variables were recoded when necessary to facilitate the analysis:

- Variable age was recoded into three categories: young (17-35 years old), middle-aged (36-54), and elders (55-81).
- Due to the divergences in the national education systems and allowing for comparisons, the variable education was recorded into three categories: primary, secondary, and higher education. The Mexican Educational system includes four categories: primary, middle, secondary–higher, and higher. For the data analysis secondary higher and higher were clustered together.
- Variable concern about climate change was recoded with a descriptive analysis as a two-categories variable (when needed): concerned and very concerned.
- Variable willingness to change behaviour was recoded into two categories: Yes and No (the latter including those who would not change behaviour, those who would be willing to but they would not do it at the end because individually would not have any impact, and those who would not do it because it is not clear if people would do what needed.

– Psychological distance variables were reversed, coding ranging from 1 (proximity) to 4 (remoteness) to climate change.

Descriptive and frequency statistics, *t*-test, chi-square, principal components analysis (PCA), regression and correlation analysis, were done by SPSS. Table 4-11 shows the type of statistical analysis run in SPSS and the logic behind it:

Table 4-11 Analyses performed with SPSS

TYPE OF ANALYSIS	PURPOSE OF THE RESEARCH
Descriptive and frequency statistics	To provide summaries of the sample and observations in the case studies: Comaltepec and Dagua and Calima
***t*-test**	To explore independence between variables for cultural theory and origin of climate change, and to check for sociodemographic factors and environmental attitudes
Mann-Whitney test	To look for differences between means for cultural theory scales depending on the options for lack of knowledge to scientists
Homogeneity Chi-Square	To check whether frequency counts were distributed identically for origin and occurrence of climate change, the importance of climate change, concern about depletion of natural resources To gauge behaviour change questions and country
Fisher's exact test	To see the significance of the association between country and preferences for asking a scientist a certain question about climate change
Principal Component Analysis	To check on the dimensionality of cultural theory items, environmental attitudes, and psychological distance
Hierarchical cluster analysis	To explore the nature of cultural theory items and scale
Regression	To predict the probability that a respondent would be concerned about climate change, perceived closeness/psychological distance, and presence/absence of a pro-environmental attitude To examine the degree of prediction of cultural theory scales and the importance of climate change, catastrophic potential, harm to future generations, and lack of knowledge to those exposed To examine the degree of prediction of perceived social and psychological distance and importance to climate change
Correlation	To quantify relation among items in the cultural theory, environmental attitudes and the psychological distance elements of the scale. To check on relation between cultural theory scales and importance of climate change, the role of the government to deal with climate change, catastrophic potential, harm to future generations, lack of knowledge to those exposed. To check on relation between perceived social and psychological distance and importance to climate change and depletion of natural resources.
Multiple regression analysis	To predict probability of concern about climate change from the value of psychological distance elements
MANOVA and discriminant analysis	To identify interactions between independent variables and their degree of association with the cultural theory scales
ANOVA	To see differences in mean in NEP scale depending on sociodemographic factors, environmental attitudes and behaviour change

Considering the importance of both cultural theory and new environmental paradigm for the thesis, following specific analysis is described for each of the theories.

4.4.3.1 Reliability analysis for cultural theory and NEP scale

Cronbach's alpha coefficient (α) was used to test the reliability of both NEP and cultural theory scales. For the coefficient to be reliable it should be Cronbach's α ≥ .7 (Tabachnick and Fidell 2007). Dimensionality of the scales was tested with principal components analysis (PCA), using Varimax rotation to ascertain whether each item load into single component equivalent to a single cultural typology. Kaiser-Meyer-Olkin (KMO) should be > .6[6]

4.4.3.2 Analysis procedures for the cultural theory

4.4.3.2.1 Cultural theory at individual level

When elaborated, the cultural theory was not intended to measure scores at the individual level. However, to better explore the cultural theory's suitability and following other studies (Marris et al. 1998), a by person analysis was carried out. To explore individual cultural bias analysis was conducted separately for each case study. To continue in the study of individual scores respondents' scores were centered on the mean. As in the research of Marris et al. in 1998, three criteria were followed using the resulting scores to identify the cultural bias of individual respondents. Therefore, to be classified at cultural bias "X": a) respondents had to have score for X≥0.5 and the other three scores <0.; b) respondents had to have score for X > 0.0 and the other three scores for the other cultural bias ≤ 0.0; c) respondents had to have score for X> 0.0 and the other scores for the other cultural bias ≤0.0 or score for X ≥ 0.5 and the other three scores <0.5.

Cultural theory items were used to check on the relation between people in the communities and cultural bias and also to predict on environmental behaviours and attitudes, level of information about climate change and importance given to climate change.

4.4.3.2.2 Cultural bias and sociodemographic factors

MANOVA analysis was carried out for the four cultural theory scale as they are part of the same theoretical construct. As Field (2009) acknowledges, MANOVA takes into account the relationship between dependent variables that are measuring the same idea. The

[6] It is could be barely acceptable to consider values greater than .5. Values below this should lead you to either collect more data or rethink which variables to include (Field 2009).

theoretical basis (cultural theory) supports the decision of lumping the dependent variables, to assess the effect of sociodemographic items on cultural theory items and to explore the relationship between the scales in cultural theory. For that purpose, an index was created as the mean score of each cultural theory scale. The analysis was performed joining both databases. Among the four options available (Field 2009), Pillai-Bartlett trace (Pillai's trace) was chosen to report MANOVA test statistics. In that respect, MANOVA was followed up by an ANOVA analysis. In the cases were MANOVA was significant but the univariate analysis did not show the same results, discriminant analysis was chosen to find a linear combination of independent variables country, age categories, gender, educational level and ideology.

4.4.3.2.3 Importance and origin of climate change

To understand the dependence of variables *t*-test was applied and simple linear regression analysis was conducted to determine if importance attached to climate change could be predicted from scores in cultural theory scales.

4.4.3.2.4 Role of State to deal with climate change

Correlation analysis was carried out to see whether there was a relation between cultural theory scales and the degree to which a person considered that Colombian and Mexico governments could deal with climate change in current context. Spearman correlation is recommended for a sample of $n<100$ (Arriaza Balmón 2006).

4.4.3.2.5 Sources of information

A descriptive analysis was performed to explore which sources of information were used according to cultural bias.

4.4.3.2.6 Risk characteristics and cultural theory

Correlation analysis was performed to see the relation between risk characteristics and cultural theory scales. The "catastrophic potential" of risk of climate change was measured by asking participants the degree of agreement/disagreement with the idea that some phenomena are supposed to increase in intensity or frequency. The "lack of knowledge to scientists" was measured testing whether the scores on cultural theory scales were the same for categories (yes or no) in considering that there was disagreement among scientist about consequences, causes and existence of climate change. Mann-Whitney test was used to look for differences between means. The effect size was calculated as follows (Field 2009) $r=\frac{Z}{\sqrt{N}}$ where Z is a z-score and N is the size of the population of the study.

According to the characteristics of society, it was expected that people were egalitarians and hierarchists, or at least score higher in egalitarianism and hierarchy. Therefore, climate change would be attributed to human causes, they would positively value the role of the State and environmental organisations in dealing with climate change, and they would use information sources close to them to be informed about climate change. As proposed by Amburgey and Thoman (2012) and Dunlap et al. (2000) the data analysis was calculated assuming a one dimension scale.

4.4.3.3 Analysis procedures for the new environmental paradigm

4.4.3.3.1 Environmental attitudes at individual level

To explore environmental attitudes in people, two criteria were used:

- Simple score mean

The score was summed to obtain the maximum score for the participant for every item. Following the mean criteria, people were categorised by having or not a pro-environmental attitude. Under this procedure, participants whose answers range between 1 and 2 would not have a pro-environmental concern whereas those whose answers were rated between 3 and 4 would be categorised as having a pro-environmental position.

- Labelling people's environmental attitudes

The resulting measure could range from 14 (low environmental concern) to 56 (high environmental concern). Respondents could point out to what degree they agreed with each statement; the environmental concern variable was calculated by adding up subject's scores on the 14 items. Summing the 14 items value, with potential values 14-56, neutrality was marked at 28, and higher values represented a greater endorsement of an environmental worldview.

The data was analysed by allocating the scores into three categories to discover nuances in the answers: i) proecological, ii) mid ecological and iii) anti ecological. This method has previously been used in other case studies by Thomson (2013)n Waikato Region, New Zealand and Beeton and colleagues (2007) in Australia. Calculation was made by using the same criteria as in the Waikato Region regional study of the application of NEP scale but adapting it to our case studies and considering the maximum score of 56 (14 items scoring four point maximum per item). For a person to be included in one category scores should be as follows:

- Pro-ecological: The score should range between 44.24 and 56 (79%-100% of agreed answers)

- Mid-ecological: Scoring from 30.24 to 44.23 (54%-78% of agreed answers)
- Anti-ecological: less than 30.24 points (less than 54% of agreed answers)

Categorisation of environmental attitudes were used to examine behaviour change, climate change occurrence and origin, concern about depletion of natural resources and importance of climate change. The NEP scale was examined according to sociodemographic factors. It was also used to test the relation between climate change occurring, importance of climate change and importance of depletion of natural resources, behaviour change, and cultural theory.

4.4.3.3.2 Environmental attitudes and sociodemographic factors

For exploring NEP, an index was calculated as the mean of NEP items for both case studies together. ANOVA and *t*-test were used to explore differences in scoring in NEP depending on sociodemographic characteristics. To calculate the size of the effect, t-value was converted into an *r* value following the equation (Field 2009) $r=\sqrt{\frac{t^2}{t^2+df}}$. In the ANOVA the effect size (ω), was calculated through $\omega 2 = \frac{SS_M - (df_M)MS_R}{SS_T + MS_R}$ (Field 2009).

4.4.3.3.3 Environmental attitudes and climate change occurrence, importance to climate change, and importance to depletion of natural resources

Correlation analysis was used to explore the relation between importance to climate change and higher scores in the NEP scale. Also, simple linear regression analysis was used to test if environmental attitudes predicted importance to climate change and importance depletion of natural resources.

4.4.3.3.4 Environmental attitudes and behaviour change and willingness to act to deal with climate change

ANOVA analysis was used to analyse differences among groups' means of whether people would prefer to have more jobs or to protect the environment.

4.4.3.3.5 Environmental attitudes and cultural bias

The cultural theory was used to predict environmental attitudes using a simple linear regression for each of the cultural theory scales. Both case studies projected people from CBNRM contexts to hold pro-environmental attitudes. Additionally, all pro-NEP responses were expected to score relatively high, and all DSP responses were expected to have a rather low score. It was expected to find differences in having a pro-environmental

attitude in terms of age, ideology and educational level but not in terms of country. Also, it was predictable that people in both Consejos Comunitarios and Santiago Comaltepec would be positive towards behaviour change and the relation between egalitarianism and environmental attitude was positive.

4.4.3.4 Qualitative analysis of climate changes definition

In Q20, respondents were asked to define with their words what they understand about climate change. Definitions of climate change were explored applying the Grounded Theory philosophy (Glaser and Strauss 1967). Grounded Theory is an inductive methodology, as a systematic generation of theory from systematic research. Grounded theory emerged from the work of Glasser and Strauss (1967) with the idea of generating new theory from data (as opposed to the method of simply testing existing theory) (Birks and Mills 2011). The authors gave foundation to qualitative analysis and legitimated qualitative research. It includes simultaneous involvement of data collection and analysis, constructing analysis codes and categories from data not from preconceived hypothesis and the samples population aims towards theory construction. Just as in quantitative analysis, qualitative analysis uses logic and can also generate theory (Charmaz 2006). Grounded theory is valuable for interpreting complex phenomena and allows one to understand socially constructed experiences and social issues. It consists of i) initial coding and categorization of data, ii) simultaneous data generation and analysis, iii) memoing: theorising backup ideas when analysing to also integrate literature, iv) intermediate coding and identifying core categories, v) advance coding and theory integration and generation (Simmons 2010). These steps were followed in the analysis of Q20 with the assistance of ATLAS.ti. The aim of the analysis for Q20 was not to create "new" theory but to identify common elements in the imaginary of people in CBNRM contexts when defining climate change. However, the rationale of grounded theory was used to analyse the provided answers.

ATLAS.ti helps to systematize qualitative information and to understand how the data was related (Flick 2013). The qualitative responses were exported from Excel™ to ATLAS.ti. Although the study did not contain a great deal of qualitative information, using ATLAS.ti facilitated the process of analysis by encoding and exploring the information in a systematic way. The frequency of the data was explored, so it was possible to identify trends and to compare climate change definitions. Categories at different levels were integrated into the definition of climate change. The option "import survey data" available in ATLAS.it was

used in the analysis of responses. Once the data was imported from Excel™, each of the seventy definitions (corresponding to responses in Q20) was turned into a primary document for analysis. Case studies were differentiated by creating two different families: Mexico and Colombia. The process of analysis followed the stages:

- Coding and categorization of data

Data was prepared using specific prefixes in the variable names in such way that ATLAS.ti could interpret the common headers and cells. The analysis was done jointly for Santiago Comaltepec and Consejos Comunitarios. Each question was analysed and selected, segment-by-segment ("quotations") being considered important, answer-by-answer. The documents had seventy quotations corresponding to seventy definitions of climate change. Open coding was used for creating new codes and associating them with existing quotations. The code-by-list was used to assign existing codes (those created in the open coding) to quotations.

To organize the hermeneutic unit (the document) of the analysis, codes were grouped to create families. In this stage, thirty-two codes were identified according to the definitions provided, but not every code was assigned for both countries (see Table 4-12). Each of the words selected represents a pattern across the climate change descriptions. Codes were: *Abrupt changes, Acid rain, Caused by humans, Caused by nature, Change in climate, Change in nature, Climate change definitions (general definition of climate change) Change in seasons, Change in temperature, Change in weather, Changes from previous situations, Climate variability, Cold, Diseases, Drought, Extreme changes, Heatwave, Heavy rains, Lack of commitment of society, Link with territory, Melting glacier caps, Misuse of natural resources, Mixing causes with consequences, Ozone layer, Plagues, Pollution, Rain, Responsibility of wealthy countries, Risk situation, Sun, Temperature, Warmer temperature, Weather*. The process of coding gave rise to 183 quotations.

Table 4-12 Codes for dimensions of climate change for network analysis

CODES	APPLICABLE IN SANTIAGO COMALTEPEC	APPLICABLE IN CONSEJOS COMUNITARIOS
Acid rain	Yes	No
Caused by humans	Yes	Yes
Caused by nature	No	Yes
CC definitions	Yes	Yes
Change in climate	Yes	Yes
Change in nature	Yes	Yes
Change in seasons	Yes	Yes
Change in temperature	Yes	Yes
Change in weather	Yes	No
Changes from the previous situation	Yes	Yes
Climate change in their territory	Yes	Yes
Climate variability	Yes	Yes
Cold	Yes	No
Diseases	Yes	No
Drought	Yes	Yes
Extremes and abrupt changes	Yes	Yes
Heat waves	Yes	Yes
Heavy rain	Yes	Yes
Lack of commitment to society	No	Yes
Melting glacier caps	No	Yes
Misuse of natural resources	Yes	Yes
Mixing causes with consequences	Yes	Yes
Ozone layer	No	Yes
Plagues	Yes	No
Pollution	Yes	Yes
Rain	Yes	Yes
Responsibility of rich countries	Yes	No
Sun	No	Yes
Temperature	Yes	Yes
Warmer temperature	Yes	Yes
Weather	Yes	Yes

Exploratory analysis of codes resulted in network analysis where codes with the highest number of quotations were selected. Afterwards, it was observed that codes were mainly related to two concepts: risk and territory.

- Creating networks. The second stage in the process was to create networks of analaysis. These networks were defined by a set of nodes and links. ATLAS.ti understands that nodes are objects being codes or quotations. When creating networks, it is possible to create a named link that allows defining the casual relationship between two nodes. Two numbers can be observed next to each code. The first one refers to the number of quotations link to that particular code (level of groundedness) and the second one to how many codes this code is link to (the level of density or code-to-code network).

- Intermediate coding and identifying core categories. From the preliminary query, it was observed that the number of codes should be reduced. At this stage, codes were checked to see if they summarized the data correctly. Additionally, codes were rewritten to move the information one-step forward to an abstract level. The number of codes was reduced after labelling quotations and performing the network analysis using the query option provided by ATLAS.ti.
- Elaborating on the findings. The theoretical model (dimensions of climate change definitions) was built after the recoding process based on a network analysis and the co-occurrence tools provided by the software. The analysis was performed with the co-occurrence explorer in ATLAS.ti to see association between and within concepts and meanings of climate change. The co-occurrence explorer shows the frequencies and the measure of strength between two codes. It is measured using the C-coefficient values, which ranges from 0-1, 0 being for codes that do not occur and 1 for codes that co-occur wherever they are used (Friese 2011). The co-occurrence explorer gave clues about the association between and within concepts and meanings of climate change for each quotation.

Chapter 5

UNDERSTANDING SUBJECTIVITY BEHIND CLIMATE CHANGE PERCEPTION

The idea of perceiving is by nature subjective. In that respect, this chapter presents the results obtained via the definition of climate change provided by the communities in the Q18, Q19 and Q20 in the questionnaire and Q-Methodology. The first section presents the findings of the narrative and the network analysis behind definitions. The discussion on the Network analysis is followed by a discussion on the results This is followed by the Q-Methodology results and the corresponding discussion about the different types of climate change perception for each case study.

5.1 How people defined climate change?

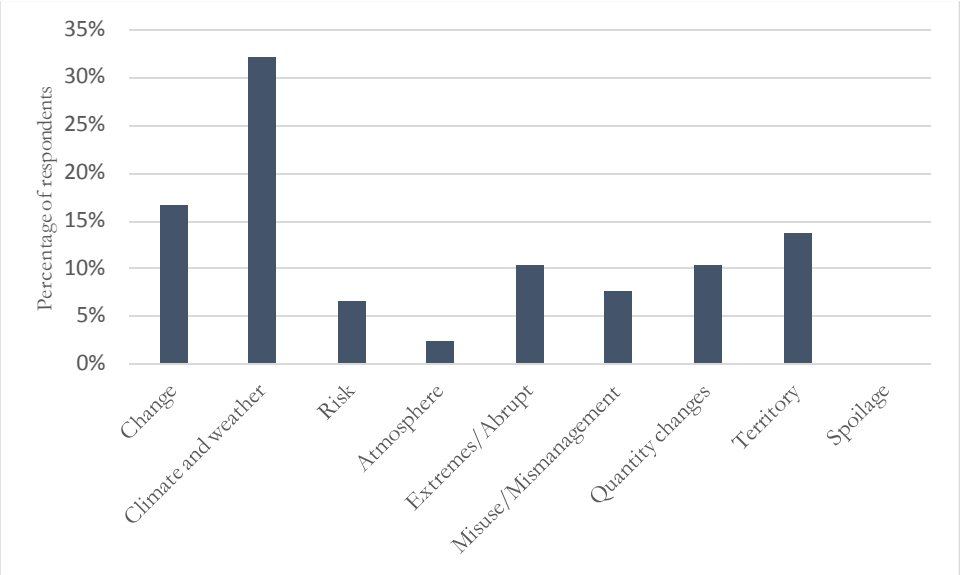
Prior to defining climate change, people were asked about whether they felt that nature had changed in the last years (Q18) and if they have ever heard about climate change (Q19). Results from Q18 confirm that 62 respondents (n=70) believe that nature had changed, which were validated with the results provided by the network analysis. The descriptive analysis shows that only four participants have not heard about climate change before. From the 70 responses, 64 were valid and six respondents did not answer the question.

Once the definitions of Q20 were exported to Excel™ and words were counted, the responses gathered a total of 1249 words (including verbs, connectors, adjectives, and nouns). Some of the words used to define climate change were either repeated or a variation on the same concept. After a word-by-word analysis, only verbs, adjectives, and nouns were kept for exploration accounting for 366 words.

In a second stage, the words were classified into eight categories based on a common term: change, climate and weather, risk, atmosphere, extremes/abrupt, misuse/mismanagement, words expressing quantity changes, and territory. The words included in each category can be seen in Table 2 Appendix 1 in the original Spanish version. Figure 5-1 shows the percentage of words included in a certain category. Here, it can be seen that 32% of the words are associated with climate or weather, and 14% of the words are related to a situation entailing change (modifications, alterations, variations).

When defining climate change participants tend to refer to ideas associated with the territory (e.g. nature, river) and also to words relating to misuse and management (e.g. tree logging, abuse, harm, waste). The total amount accounts for 14% and 8% of the terms respectively. From what it is observed, the anthropogenic component is included in the imaginary when defining climate change.

Figure 5-1 Category of concepts in the definitions of climate change



Following the results of Q20 come in the form of network analysis with the codes extracted from the analysis of climate change definitions. Seven codes were clustered and named "risk". These codes were "changes from a previous situation", "disease", "drought", "extremes and abrupt changes", "heat waves", "heavy rain", and "risk situation" (Figure 5-2). The term "territory" clustered seven codes as well: "climate change in their territory, "plagues, and change in natures", "misuse of natural resources", "disease", "droughts", and "changes in the previous situation" (Figure 5-3). To see how climate change was affecting their territory, the relation between codes within this category was established as it can be seen in the above mentioned figures.

Figure 5-2 Network analysis for "territory" and the associated concepts

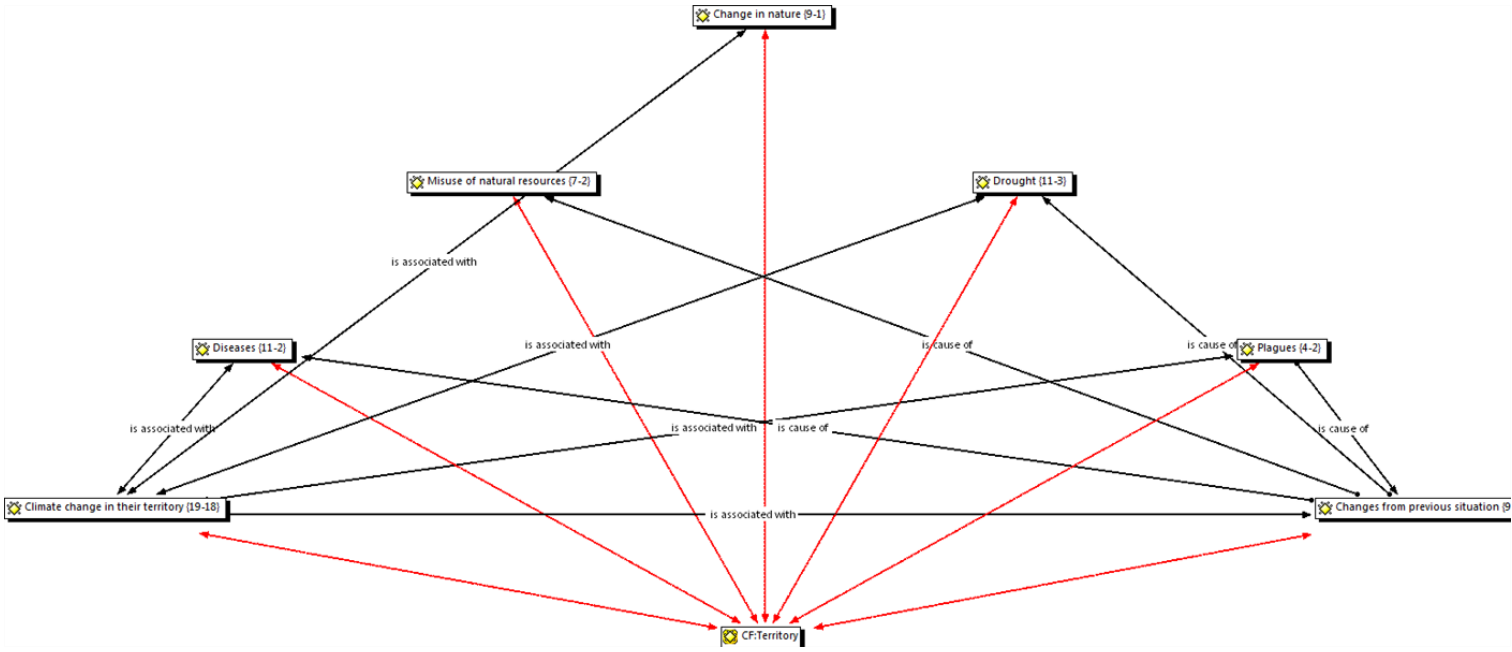
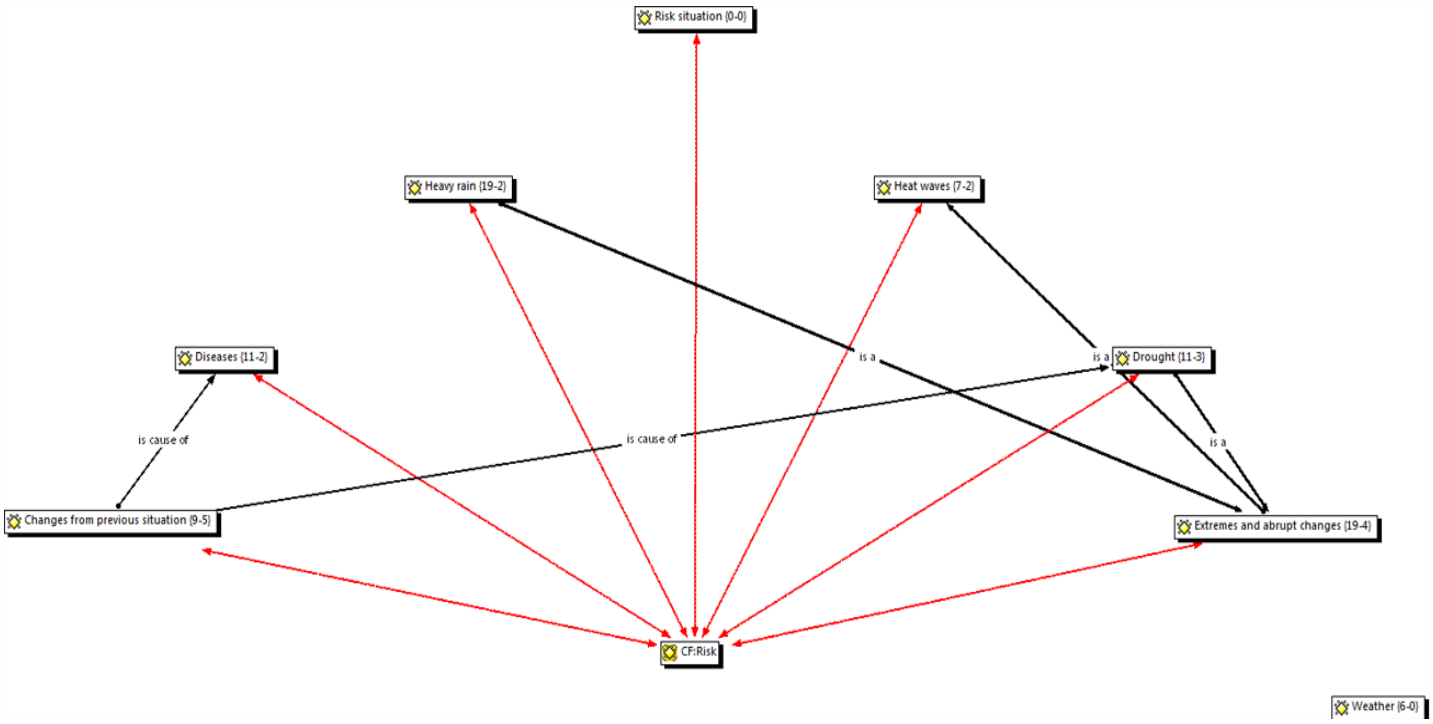


Figure 5-3 Network analysis for "risk" and the associated concepts



Considering both family codes ("risk" and "territory") and the associations emerged from them, one common aspect was identified: the idea that climate change represents for participants a "change from a previous situation". This idea is related to both the territory and the risk climate change entails (Figure 2 and Figure 3). For the participants, the shift implicates new diseases, plagues, droughts, extremes, and abrupt changes as torrential rains and heat waves. All these risky situations are part of climate change and are already felt in the territory. These modifications are not only due to natural causes but also to the misuse of natural resources (Figure 4-2).

The quotations below reflect that people in the communities understand climate change as part of their territory. The first number close to the quotation refers to the quotation number, and it is followed by a second number indicating the times the quotation has been assigned a code. All participants' quotations can be seen in Understanding Subjectivity Table 3 Appendix 1.

Quotation36:3 *destruction, misuse, and abuse*

Quotation 63:3 *there are more diseases*

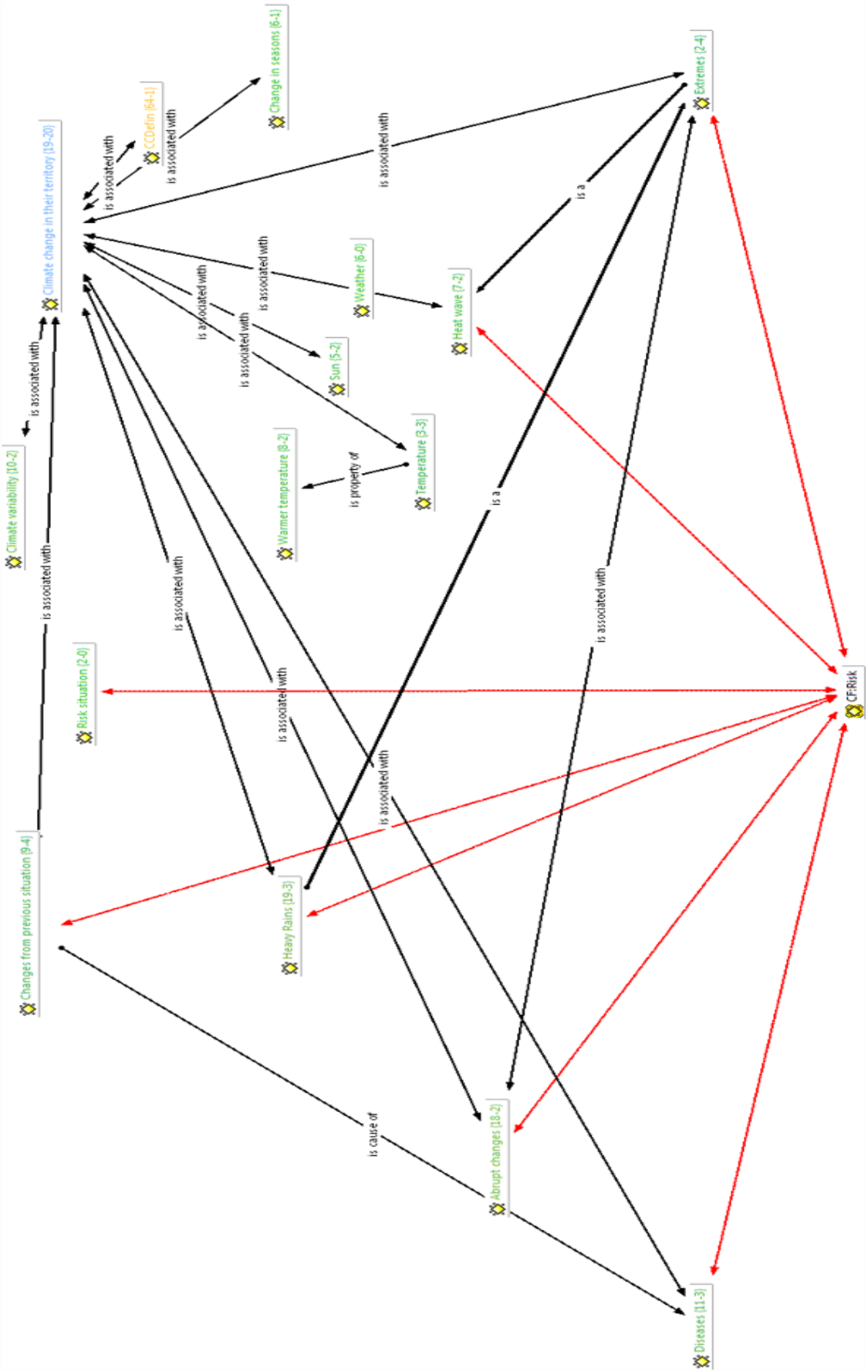
Quotation 68:3 *sometimes it rains very heavily and on other occasions there is drought*

One of the most significant relations is the one emerging from variations from an earlier situation and climate changes in their territory (Figure5-3). This association is noteworthy because it shows how climate change effects are felt in both communities. The network analysis reveals that climate change in their territory is directly associated with the nature transformations and the effects of climate change (pollution, climate variability, heat waves). This reinforces the idea that climate change is not divorced from their territory:

Quotation 57:3 *now the plants do not grow, and there are not any fruits*

Quotation62:2 it *is not the same as 30 or 40 years ago. At present, there are unexpected abrupt changes of long rainy spells, of weather, climates and rains*

Figure 4-2 Network analysis for "risk" and "changes from previous situation"



The association in the number of quotations coded demonstrates that communities use their experience when defining climate change (Figure 5-4 and Figure5-3). Climate change in their territory is linked with other 19 codes. Participants lean towards the use of terminology related to climate change and weather. Mainly associations are linked to the potential causes and effects of climate change (climate variability, temperature, and change in season) and situations entailing risk and extreme changes (Figure 5-4).

Quotation 49:4 *climate changes very much*
Quotation 44:4 *torrential rains*

Going further with the analysis of how people bring climate change into their territory, respondents mention several times the misuse of natural resources related concepts.
The misuse of natural resources is indirectly related to the idea of climate change in their territory. The former one originates a change from the previous situation that is related to climate change in their territory (). These are related in two ways: First, the misuse is caused by humans, and secondly, it is causing a shift from the prior condition. Again, as observed in the word counted analysis, this reinforces the idea that the anthropogenic aspect of climate change is crucial in the imaginary of respondents. As they admit that changes experienced in the communities, and also climate change is induced by humans. Quotations are also the same or were within others referring to "change in nature", "mixing causes and consequences", "rain and ozone layer".

Quotation 31:2 *the result of the misuse carried out in nature*
Quotation 40:1 *it is the result of the actions taken by human being with nature*
Quotation 21:2 *it is a phenomenon which has been increasing in our planet for many reasons, among which you find: the loss of vegetation coverage, increase of acid rains, greenhouse effect and deterioration of ozone layer as a result of climate change.*

Figure5-3 Network analysis for "territory" and "climate change in their territory"

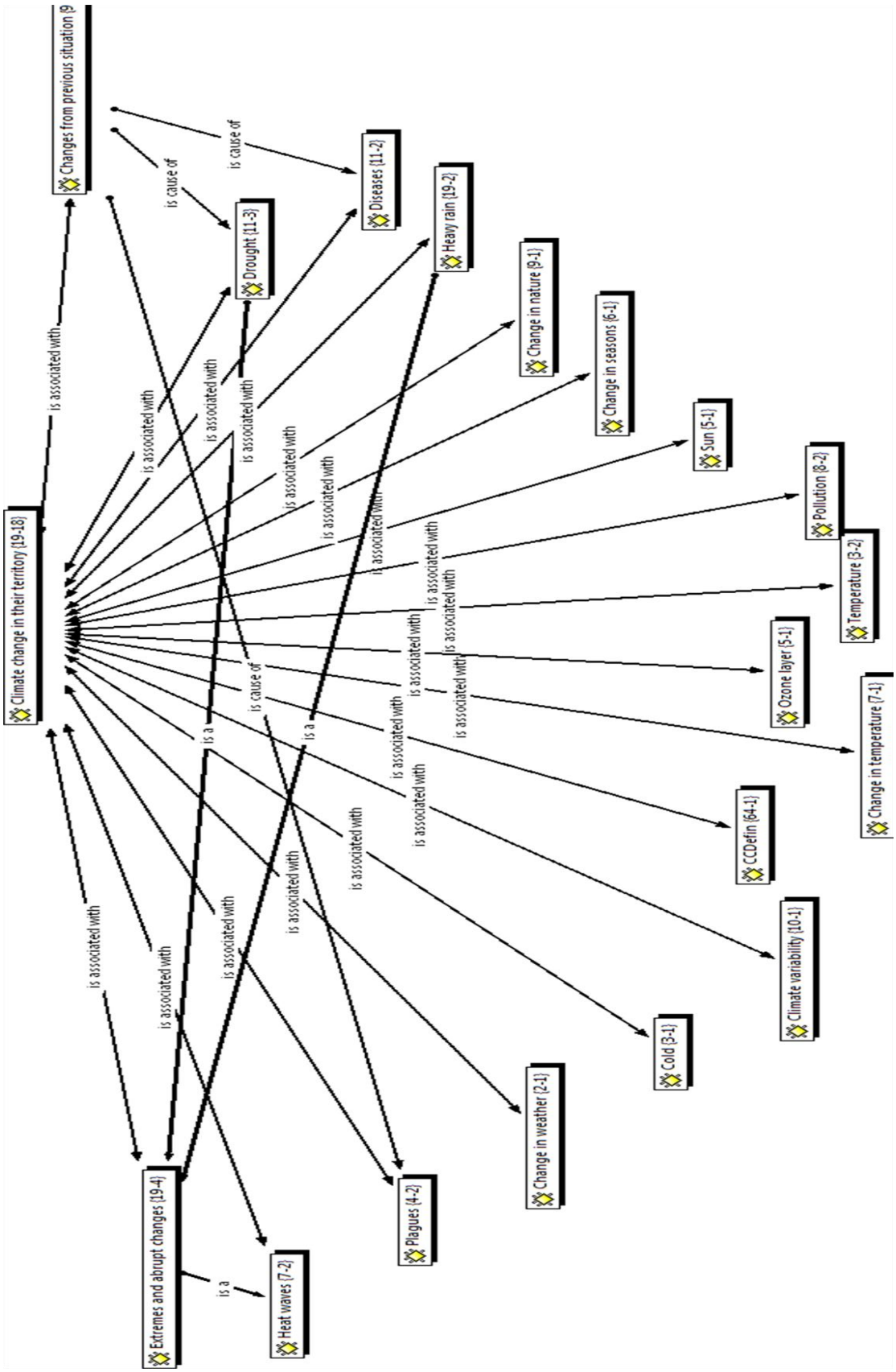


Figure 5-4 Network analysis of "territory" and "extremes and abrupt changes"

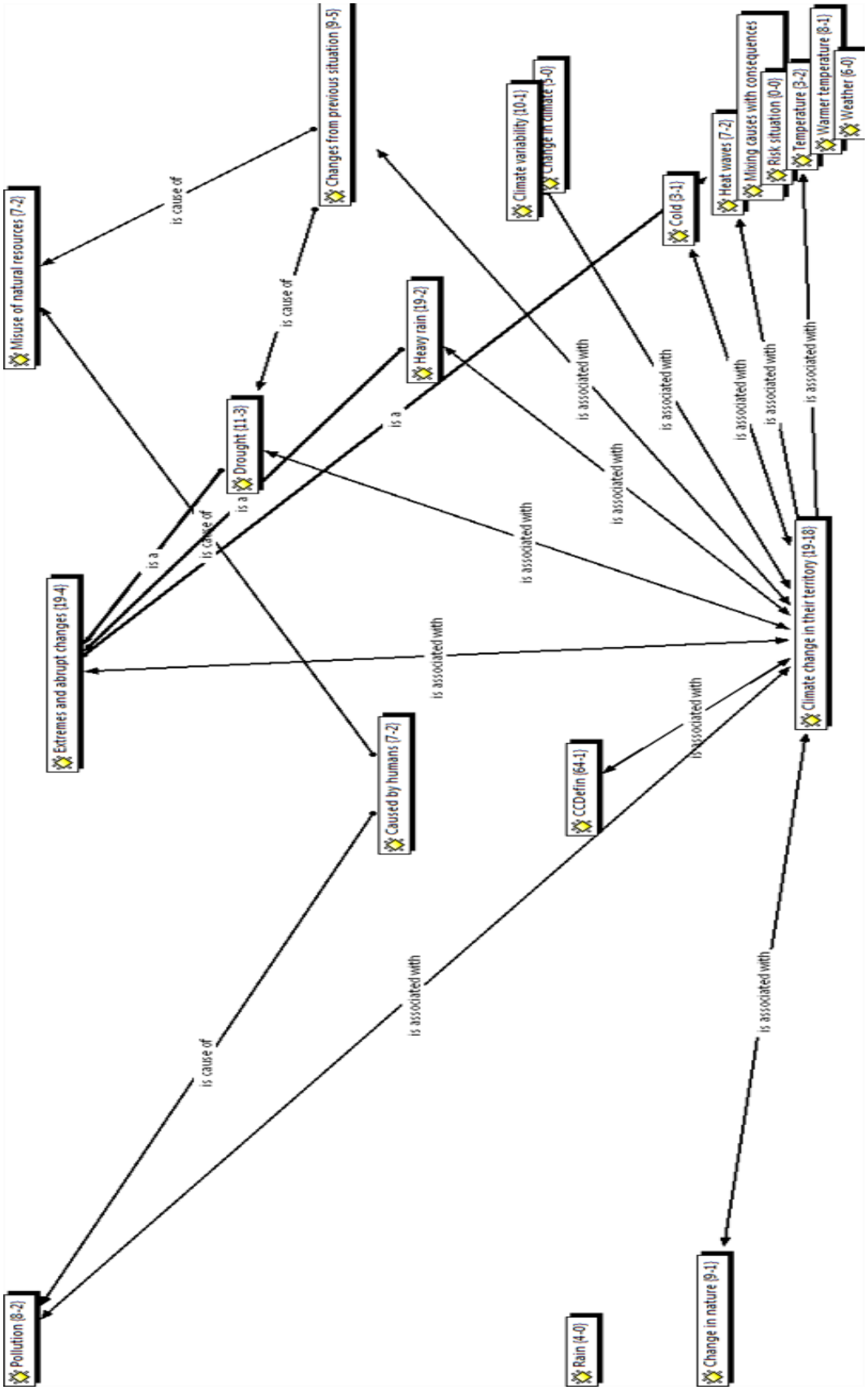
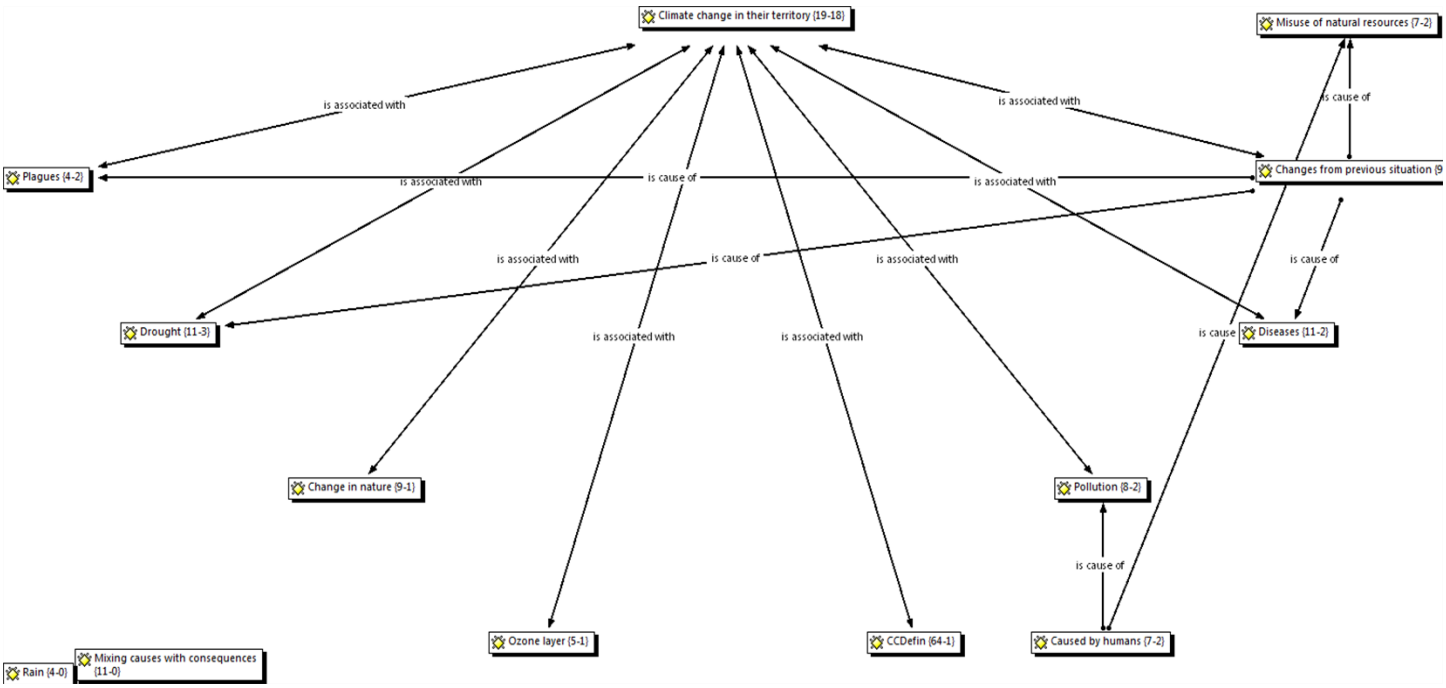


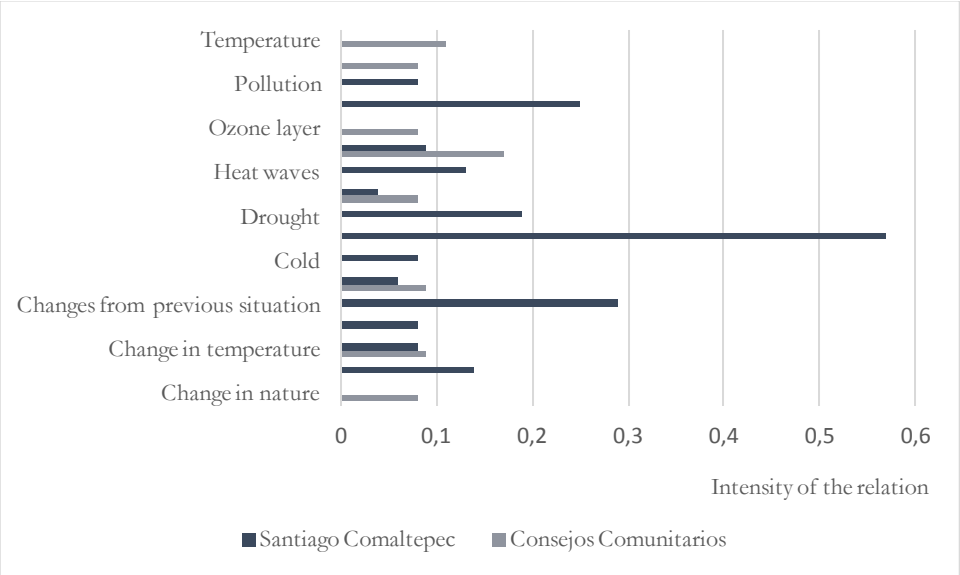
Figure 5-5 Network analysis for "changes from previous situation" and "the misuse of natural resources"



5.1.1 Differences between Santiago Comaltepec Comaltepec and Consejos Comunitarios

So far the results presented were for both case studies. To differentiate between them, the analysis was performed for Santiago Comaltepec and Consejos Comunitarios separately. Figure 1 in Appendix 2 for Consejos Comunitarios and Santiago Comaltepec show the view of associations between concepts, their intensity, their meanings, and their role in constructing the climate change phenomenon. That is to say, codes appearing exactly in the same quotation or quotations that were "touching" each other. Co-occurrence code analysis was focused on the relation between dimensions: climate change in the territory, misuse of natural resources, changes from the previous situation, and extremes and abrupt changes. The closer to 1 the co-occurrence code is the stronger the relation between codes. Data in the Figure 5-8 and the quotations below demonstrate that in Santiago Comaltepec climate change in the territory is related to diseases, and plagues that are not within the discourse of Colombian participants. In the case of Consejos Comunitarios, participants associated territory to climate change using mostly concepts related to weather and other environmental issues such as the ozone layer.

Figure 5-6 Correlation between climate change concepts and the concept "territory"

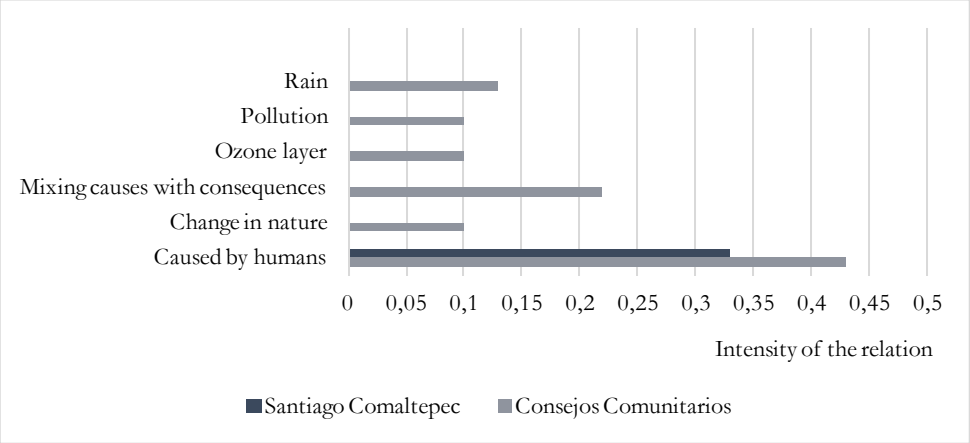


Quotation *53:3 there are diseases that were non-existent in the past*
Quotation *55:4 plagues in plants*
Quotation *58:3 there are many diseases*
Quotation *47:2 now it is not like in the past, production in agriculture has dropped, there are more diseases, people do not want to eat things produced in the country. Temperature now is much warmer*
Quotation 10:2 *it is transformation of nature*
Quotation 24:3 *the ozone layer has been destroyed and this affects because the territory is more exposed to sunbeams.*
Quotation 6:2 *our temperature changes very much*

The dimension misuse of natural resources (Figure5-9) reflects that the anthropogenic effect is associated to climate change. Colombian participants coincided with it and also related it to change in nature, mixing causes and consequences and the ozone layer.

Quotation 44:2 *it is due to our lack of care, forest felling*
Quotation 31:2 *this is the result of the misuse carried out in nature*
Quotation 30:4 *forest burns and fellings*
12: *it is our fault, human beings' fault, because of rubbish dumps. There are many floods, pollution and the ozone layer is being destroyed.*

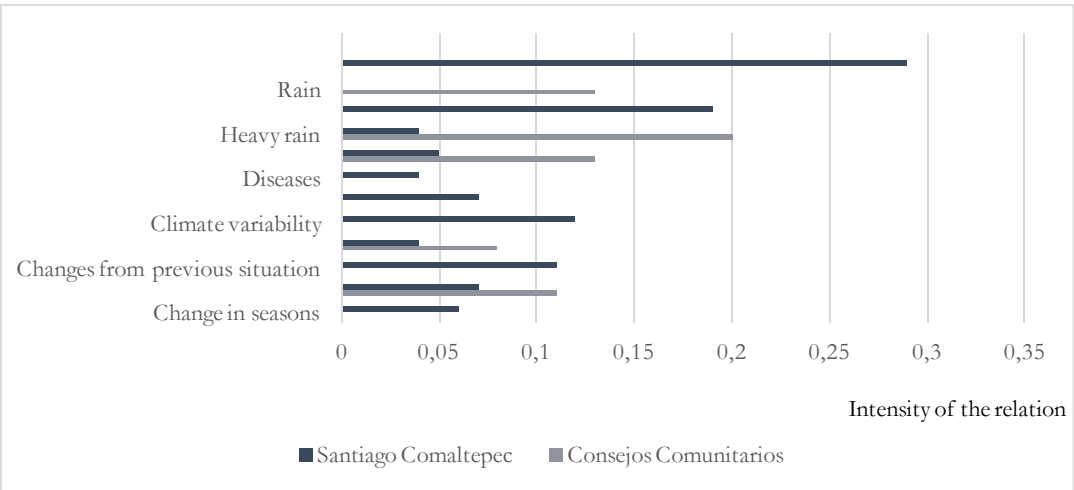
Figure 5-7 Correlation between climate change concepts and the "misuse of natural resources"



Quotation 47:2 *now it is not like in the past, production in agriculture has dropped*
Quotation 66:2 *nowadays the way it rains is not normal*
Quotation 57:3 *now the plants do not grow, and there are not any fruits*
Quotation 62:3 *there are abrupt changes*
Quotation 34:5 *the sun did not heat so much as now*

Extremes and abrupt changes conform the definition of climate change as well. People from Comaltepec relate more extremes and abrupt changes to climate change than participants from Consejos Comunitarios (Figure 5-10). For the former ones, quotations refer to the weather, mixed causes and consequences when referring to climate change, climate variability and changes from the previous situation. In Colombia the quotations under this were associated with codes related to weather and climate components (e.g. rains, torrential rains).

Figure 5-8 Correlation between the concept "extremes" and "abrupt changes"



Quotation *62:3 there are abrupt changes*

Quotation *60:2 the hard change in weather behavior*

Quotation *48:1 Heavy rains and sudden heat - seasons vary, and it does not rain in due time*

Quotation *32:2 they are sudden changes in temperature*

Quotation *35:2 they are the sudden changes appearing when there has been a drought, and suddenly a storm comes*

5.2 Discussing and defining the meanings of climate change

In the following section a discussion of the results of the Network analysis is presented. Here, it is discussed the how people in the communities define climate change and the terminology and language used to construct definitions of climate change.

5.2.1 I am not an expert, but I comprehend climate change

Both the indigenous character of the communities and the close relation they have with nature serve for creating a meaning forclimate change (what individuals think aboutclimate change). Results from the network suggested that people in the communities attach importance to two main ideas associated with climate change. First, *what* is going to happen, which is to say what the risk of climate change is. And second, *where* it is occurring and going to occur, paying special interest to the local effect and their territory. In their imaginary these two questions are inseparable and conform the word sense of climate change.

A closer view of the definitions provided by participants in both case studies ratifies that scientists and lay public visions of climate change differ (Whitmarsh 2009, Chowdhury et al. 2011). Unlike conventional scientific explanations (Baede 2007, Park 2013, IPCC 2014e) individuals in Santiago Comaltepec and Consejos Comunitarios do not untie causes and consequences when describing climate change. Furthermore, they do not appreciate the concept without explaining the effects that (according to them) are already ongoing. None of the scientifically accepted definitions of climate change worldwide include either consequences or other aspects linked to human-related issues. Climate change is defined by a pure scientific explanation of the process. For instance, the US Environment Protection Agency (US EPA) states that climate change is *any significant change in the measures of dimate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.* The IPCC describes it as *any change in climate over time, whether due to natural variability or as a result of human*

activity. Meanwhile, the United Nations Framework Convention on Climate Change (UNFCCC) considers that it is *a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods*.

In contrast, communitie's definitions are pictured in more real terms, in line with their daily lives. For instance, climate change is a *transformation of nature, as I say, extinction of many animals and many storms that may take place, for example if you sow without using fertilizers nowadays the plants grow dry* (Def. 10 Consejos Comunitarios, male). Climate change is *peoples attitudes about the way we damage our planet,* (Def. 41, Santiago Comaltepec, female*),* and the *very abrupt changes of temperature, too much rain and acid rains causing losses and diseases in human beings, plants and animals* (Def. 67, Santiago Comaltepec, male).

Descriptions of climate change express how diverse meanings for scientists and laypeople are (Chowdhury et al. 2011, Taylor et al. 2014). Laypeople (in this case people within the communities) explain and understand it by using their own experience, but scientists rely on scientific modelling and measurement (Pearce 2004 as cited in Whitmarsh, 2005). This should not cause surprise, as experiences with climate change are produced locally. In this sense, scientific meanings of climate change would lack "contextualized knowledge" (Whitmarsh 2005) that laypeople require for a proper understanding of the phenomenon.

Nevertheless, some common points are identified between scientific and lay definitions. Both of them recognize the state of varying and change implicit in climate change. Alterations are random and even unexpected (change in season, temperature). However, the subject and object of change differ. For individuals in the communities, the changes they perceive modify the state and the traditional rhythm of management of natural resources. The little control they have over the unpredictable and changing "weather" coincides with elements of the risk society (Beck 1992a). In the risk society, traditional ways of dealing with natural changes could no longer be valid, and it might be needed to introduce new social arrangements to control and cope with climate change.

Another shared feature is that lay and scientific definitions admit the human-induced influence of climate change. This recognition of the human influence in boosting and triggering climate change supports the precepts of the Beck's risk society (1992). Still, the human influence is admitted differently. For science, it is based on the current model of development and growth. For individuals in communities, it is due to a bad and even perverse use of natural resources. However, participants' definitions go beyond this and use their own experience to explain it. People in the communities acknowledge their own

responsibility while scientists only acknowledge the abstracts responsibility of humans. This reflects that experience and knowledge can shape perceptions and make people to construe their own idea of climate change independently of what the objective and scientific approved definition is.

5.2.2 We feel climate change here

To deepen in the core meaning of climate change and bring back the two questions mentioned above, three issues are held in common by individuals in Santiago Comaltepec and Consejos Comunitarios. First, respondents express the effects of climate change related to weather, Secondly, they do not separate themselves from both causing and being impacted by climate change. Finnally, it is also manifested that climate change is is linked to other environmental problems. Current and future impacts projected for Colombia and Mexico by IPCC (2014b), as for , droughts periods, shorter rainy seasons, loss of biodiversity and increase in temperatures, align with people's observations. Respondents in Santiago Comaltepec and Consejos Comunitarios find the effects of climate change associated with weather. Elements of weather such as temperature, rainier days, increase in temperatures, and wind are constant along their definitions. People commonly describe climate by referring to local and concrete impacts (Kempton 1990, Whitmarsh 2005, Boillat and Berkes 2013) because climate is not directly observable (at least not on a short-term basis). As shown in the results, participants use familiar concepts, experience, and observations to describe the (locally specific) impacts of climate change. Apparently climate change is not merely a theoretical concept for them. They identify themselves as part of the climate change "risk group" and they also reported "direct experience" with risk, making it "less abstract" for them (Trope and Liberman 2010, Spence et al. 2012). Without being too strict, this may indicate that the population in both case studies do not establish psychological distance with climate change. They articulate a general definition of climate change and generalize to broader contexts from what they locally observed. Their idiosyncrasy is revealed when placing nature first for describing both causes and effects of climate change. Secondly, people do not t dissociate themselves from neither causes nor consequences of climate change. Contrary to what is found elsewhere (Whitmarsh 2009), they assume blame and do not deny self-responsibility for causing environmental damages, therefore climate change. Despite opposing findings (Whitmarsh 2009), it is a current trend that general public almost everywhere tends to attribute climate change to human activities (Ray and Pugliese 2011). Communities' idea is that human activities cause climate change. However, causes are quite different from those referred to by science. People in both case

studies attributed the causes to the misuse of natural resources and this is directly related to human actions. Furthermore, natural climate variability is not seen as a driving force of climate change. Interpretations of the cause of climate change are given to a loss of values, reflected in a bad human use of natural resources, lack of commitment and attitudes. The latter aspect was specifically highlighted in the Mexican case study *community members do not want to eat food from the land* Defi.47 Santiago Comaltepec, female).

As for the impacts of climate change, more prominence is given to the effects in nature than in humans; these are relegated to the background. As for many indigenous communities (Ishaya et al. 2008, Boillat and Berkes 2013), people in both Santiago Comaltepec and Consejos Comunitarios perceived that nature around them has changed in the last years: rivers are less plentiful, production has decreased and so has the crop quality and soil is drier. *This is not like it used to be as elder people say* (Def.54. Santiago Comaltepec, female). Participants from Santiago Comaltepec, pointed out that more diseases and new plagues have appeared as found by Varadan and Kumar (2014). The presence of invasive species not only will affect the way communities protect their environment and plants, but also how they will carry on their traditional practices in the future and the prevalence of social arrangements and networks (Whyte 2015).

Culture and traditions are also potentially affected by climate change, specially in indigenous communities and where people depend on natural resources (ACIA 2005, Ulloa et al. 2008, Voggesser et al. 2013, Bennett et al. 2014). Contrary to what could have been expected, cultural aspects were not cited in their definitions of climate change.

Last but not least, meanings of climate change are tied to broader environmental problems, such as tree felling, pollution or littering (Whitmarsh 2009). The case of ozone depletion is particularly remarkable. Individuals in Consejos Comunitarios cited the thinning of the ozone layer in their definitions of climate change, either as a direct cause of the phenomenon or as a consequence. Misinterpretation about the relation between the ozone layer and climate change or global warming has been a constant in other research (Bostrom and Lashof 2007, Reynolds et al. 2010). Sometimes, lay people think that the thinning ozone layer is due to climate change and vice-versa (Leiserowitz 2007b, Whitmarsh 2009). This question is considered as an important issue to bear in mind when explaining the science behind climate change (Rodriguez Becerra and Mance 2009). Other environmental problems commonly related are *more pollution* or *acid rains* (Def. 63 Santiago Comaltepec, female), *it is global warming that the earth is undergoing* (Def.33 Consejos Comunitarios, female).

Other misconceptions result from confusing causes and consequences of climate change, describing it as either resulting from or causing unexpected heat and rain, an increase in temperature or change in the seasons. For instance, *abrupt changes when there is drought* (Def.35 Consejos Comunitarios, male) and *more news about earthquakes, droughts and floods* (Def.46, Santiago Comaltepec, male) (Chowdhury et al. 2011). Some of the misunderstandings reflect that people are indeed familiarized with particular climate terminology. Definitions are fraught with scientific ideas, yet individuals are unaware of the climate change physical process (why and how this is generated). Perhaps, this is the result of either individuals having difficulty decoding or interpreting climate change-related information, or that the information reaching them is not clear enough.

As previously said climate change is already felt in Santiago Comaltepec and Consejos Comunitarios. People, the environment and livelihoods are now being affected (ACIA 2005; Vinyeta, Whyte, and Lynn 2015; Whyte 2015). People being unable to articulate a definition of climate change without mentioning the changes in their close environment, confirm that climate change possess serious threat and challenges indigenous communities environmentally (Whyte 2013). Two main issues intervene in the construction of climate change meanings. First, language expressed using scientific terminology. Second, this terminology is mixed with their own experiences and with what they believe climate change is. Concurring with Elder-Vass (2012) and particularly for this case, in the process of mental construction of climate change both experiences and language are needed for people to elaborate their reality.

5.3 Exploring Visions of climate change

This section reflects the different perspectives on climate change within the communities emerged from the Q-Methodology analysis. Q-sorts loading significantly on a particular factor exhibit a very similar sorting pattern or configuration, meaning an analogous viewpoint of participants about climate change. The visions are presented first for the Consejos Comunitarios followed by the Comaltepec case. When describing perceptions, the statement number is included to identify better the correspondence between statements and how these shape views on climate change after each idea. Table5-1 contains the factor array for each perception type by case study. Along with the distinguished statements, it provides the basis for the interpretation of views on climate change.

On factor 3 in Consejos Comunitarios, it can be observed that there is a tie in the distribution between +3 and +2, this resulting in an overpopulated +2 category and

reduced the number of statements receiving a score of +3 (Table 5-1). PQMethod program could not choose itself where to locate statement 4, so it retained all of the tied statements in +2. There are two solutions to solve this issue: i) promoting one of the +2 statements to category +3 and, ii) reporting the results as z-scores rather than the +4/-4 standard scores. Whatever strategy is pursued this would have practically zero impact on the factor interpretation, hence the decision was made to proceed with the +4/-4 scores provided by PQMethod program. The same situation is presented in the case of Santiago Comaltepec on factor 3. A tie in the distribution between -1 and 0 can be observed in the data, this resulting in one extra statement in the -1 position. As for the previous case, the score for the analysis was those provided by PQMethod on the +4/-4 positions

Table 5-1 Factor arrays for each statement per case study

		CONSEJOS COMUNITARIOS			SANTIAGO COMALTEPEC		
	FACTOR ARRAYS	1	2	3	1	2	3
STATEMENT							
S1	I feel guilty about my contribution to climate change	0	0	2	1	0	1
S2	We have to stop climate change to save natural ecosystems	3	2	0	3	3	0
S3	The media does a poor job at conveying the effect of climate change to the public	-1	0	-2	0	-3	4
S4	When it comes to climate change impacts here, municipality should be prepared to deal with them	0	0	2	1	3	2
S5	More educational programs are needed to increase public awareness about climate change	3	2	1	3	0	0
S6	People are not thinking about the long-term effects of what they do on the environment.	0	4	-1	4	1	-4
S7	It is difficult to trust what comes out in the media on the issue of climate change	-1	0	0	0	-1	2
S8	I trust what I hear about climate change from government	-1	-1	-1	-2	-2	1
S9	I feel I need more information about climate change	0	1	2	0	-1	1
S10	People in modern industrialized countries will not be harm by climate change	-2	-3	-2	-2	-4	3
S11	I think that climate change will bring good things to my community	-4	0	-3	-3	-3	2
S12	It is unfair to leave climate change to be solved by future generations	2	3	3	4	0	-2
S13	Buying local products is a good way to care about the environment	0	0	3	-1	3	0
S14	There is not enough information to definitively say that climate change is real	-2	0	-3	-2	-2	-4
S15	Plants and animals have as much right as humans to exist	1	3	-1	2	4	2
S16	The government should have stopped climate change from happening	0	1	-3	-1	0	-1
S17	Nowadays, in my territory rains are much stronger, and it rains more than years ago	0	-4	0	0	0	-2
S18	I think climate change should be a priority for our government	2	2	0	1	0	3
S19	There are lots of disagreement among scientist about whether or not climate change is happening	-2	-1	1	-1	-2	-2
S20	People do not need to feel more concerned about climate change issues as these are not under their control	-4	-1	-4	-3	-2	-1
S21	The government should take responsibility for legislating on environmental issues a great deal more than it does	1	1	1	0	2	-1
S22	In my community, we know well the environment, and we know when nature does not behave	1	-1	-1	-1	1	0

		CONSEJOS COMUNITARIOS			SANTIAGO COMALTEPEC		
	normally						
S23	If the environment changed, culture and traditions would not be the same	2	1	-1	-1	-1	3
S24	When it comes to changing climate; I would rather be safe than sorry	4	-2	1	1	2	1
S25	When buying things I think of nature and the costs these products generated in the environment	0	-3	0	0	2	1
S26	Only when people feel affected by climate change will they act	-2	-1	0	2	-4	-3
S27	We should wait for the government to act on climate change	-2	-2	-4	-3	-1	-1
S28	Before we do anything, it has to be proven that people cause climate change	-1	-1	1	0	1	0
S29	If we do not act now, climate change will lead us to disaster	4	2	-1	1	2	2
S30	We need industries and fossil fuels to keep our economy running	-3	-2	1	-2	-3	-2
S31	Environmental organizations scare the public with talk of climate change	-1	-2	0	-2	-1	-3
S32	I trust what scientist say about climate change	1	-4	-2	-1	0	-1
S33	In my community, we sometimes misuse natural resources	1	0	2	0	-2	4
S34	The earth has plenty of natural resources if we just learn how to develop them	-3	1	-2	-4	0	-1
S35	We all have the responsibility for environmental problems	3	3	4	2	4	0
S36	Nature easily adapts and recover from any damage caused by people	-3	-3	0	-4	-1	-2
S37	If people in richer countries around the world would take action to save energy, we will reduce climate change a lot	2	-2	0	1	2	-3
S38	The environment in my community has changed considerably over recent years	1	0	-2	0	0	1
S39	climate change is an important environmental issue	0	2	2	3	1	0
S40	I am very concern about the environment	2	4	2	2	1	-1
S41	Industries should use new technology to become more efficient and help stop climate change	-1	1	4	2	1	0

During the interpretation, attention was given to statements distinguished at $p < .05$ and to items ranked at +4 and -4 for each factor. Statements ranked as neutral also helped to understand the subtleties of the viewpoints (Watts and Stenner, 2012). Additionally, consensus statements referring to all factors agreeing were identified in the analysis.

One of the advantages of Q-Methodology is the ability to explore and uncover different viewpoints. The logic behind Q-Methodology is that "theory and judgment must be relied upon in the absence of other criteria (and, if need be, in spite of them) when determining the number of factors (in this case components) to be extracted and the degree of importance to be attached to each" (Brown 1980 p. 43). Consequently, statistical and theoretical criteria were granted equal importance for interpreting the data.

5.3.1 Visions of climate change in Consejos Comunitarios

In the Colombian case study, three factors were extracted, and varimax rotated, and together explained 56% of the study variance. Statements were distributed within each factor. Table 5-2 shows participants defining and sharing a view of climate change. Nineteen of the 23 Q-sorts loaded significantly on one or other of these components, and four confounders' Q-sorts (participants loading significantly on two different components) were excluded from the construction of the final solution. Such sorts are poor choices for defining a factor and do not define and help distinguished viewpoints (Brown 1992). In Table 5-2 the X´s indicate those persons associated with a particular factor significant at $p<0.01$.

Table 5-2 Rotated factor Matrix for Consejos Comunitarios

	PERCEPTION 1	PERCEPTION 2	PERCEPTION 3
PARTICIPANT			
2	0.5118X	0.3092	0.3962
7	0.7442X	0.0984	-0.0913
8	0.5341X	0.0046	0.3827
10	0.6761X	0.1844	0.0989
13	0.4676X	0.1184	0.2688
14	0.7776X	0.0232	-0.0035
17	0.7148X	0.0028	0.3635
18	0.6927X	0.1969	0.3389
20	0.5917X	0.3972	0.3381
22	0.6393X	0.4832	0.2675
23	0.7291X	0.2103	0.0830
9	0.1643	0.6999X	-0.2658
12	0.3938	0.6865X	0.2630
15	-0.0175	0.6761X	0.3086
19	-0.0404	0.5946X	0.2288
21	0.0742	0.5462X	-0.0776
3	0.3422	0.2225	0.7078X
4	-0.0233	0.0805	0.8736X
5	0.4124	-0.0373	0.4973X
CONFOUNDED Q-SORTS			
1	0.4789	0.4299	0.3894
6	0.5587	0.5953	0.2697
11	0.4905	0.4895	0.0081
16	0.4852	0.4515	0.1332
TOTAL DEFINING Q-SORTS	11	5	3
% EXPL.VAR.	27	16	13

5.3.1.1 Perception 1

Eleven participants (four women and seven men) were significantly associated with this factor whose age ranged from 23 to 60 years old (36 years old on average). This perception is characterized by an eco-centric view regarding nature (S15). Participants adhered to this opinion know how nature works (S22) and have observed how it has been altered in the past years (S38). People holding this view acknowledged the importance to climate change (S39). To date, they have not perceived changes in climate in their territory (S17). As a community, they are concerned with environmental problems and think that people should feel concerned about climate change (S20), as nature is fragile and delicate (S36). They also claim the implication of industrialized countries in dealing with climate change (S37) but the role to be played by industries is not that clear (S41).

Participant 23: *This helps me realizing how man originates changes in the environment and how little we do to control it.*

This group trusts what scientists say about climate change (S32) and positively value the role of media and environmental organizations as sources of information (S7). They consider they need more information about climate change (S9). They acknowledge that climate change might have consequences not only for people but also for wildlife and culture (S23). Consequently, there is an urgent need to stop it (S29, S24) before it affects the population (S26). Accordingly, their territory should be prepared for dealing with any climate change consequences (S4) even though discourse-holders do not consider themselves responsible for contributing to climate change (S1).

5.3.1.2 Perception 2

Four women and a man from 26 to 55 years old represent this discourse, with an average age of 33 years old. They are concerned about the environment (S6, S40) and grant the same right to plants, animals and man to exist (S15). However, individualists' views distinguish the majority of their ideas, e.g., they emphasize that Earth has enough resources to satisfy human needs, and consequently humans should use them freely (S34). They reject the idea that weather patterns have changed in their territory (S17). People who hold these views do not feel responsible for their contribution to climate change (S1) neither do they recognize consequences for purchasing products that harm the environment (S25). The available information is not sufficient to assert that climate change is real. Furthermore, they mistrust what scientist's state about climate change (S14, S32). They have though a neutral, rather positive vision of the role of media and environmental organisation as information sources (S3, S7). However, they admit that climate change should be tackled with celerity (S29) and that people should be concerned about it (S20).

Participants consider environmental risks as opportunities and are not bothered by environmental problems. Moreover, climate change could bring some positive consequences to their territory (S11). Hence, there is no need to apply the precautionary principle (S24) and neither is there a requirement for the local government to protect their territory from the effects of climate change (S4) nor for people in industrialized countries (S37). For them, industries could improve their means of production by using more efficient technologies (S41).

5.3.1.3 Perception 3

Three women aged 34, 46 and 49 years old hold this view of climate change. For them humans have different rights from plants and animals (S15) but recognize collective responsibility for environmental problems/issues (S35, S1) and a collective obligation to deal with climate change (S27, S37).

This view acknowledges that humans could control climate change (S20), and believes it will not lead to disastrous consequences (S2, S23, S29). They have not seen changes in their territory (S17). Because nature could recover from any damage caused by people (S36), it is not necessary to prioritize climate change on the political agenda (S18), but it is wise to have a foresighted and cautious attitude (S24).

This viewpoint envisages the necessity of the existence of businesses (oil and industry) for the economy to perform (S30). However, it is crucial that companies use efficient technologies that could tackle climate change (S41) and for local people and government to be involved (S13, S4, S16). The importance is given to public and private institutions, along with the importance assigned to economic growth, clearly identifies this perception as a hierarchical type of cultural climate change management.

The role of science and scientists is called into question. The level of confidence in science is very low (S19, S32), due to the disagreement among scientists about climate change. According to them, scientists should demonstrate the anthropogenic origin of climate change (S28).

5.3.1.4 Areas of consensus

Following the areas of consensus between the visions are presented corresponding to statements that do not distinguish between any pair of factors (components). That is to say aspects of climate change common for each of the perceptions. All listed statements in are non-significant at P>.01, and those flagged with an * are also non-significant at P>.05.

For Consejos Comunitarios, it is a general belief that environmental problems are everyone's responsibility, and climate change affects communities globally (S35, S10). There is a consensus in not leaving climate change issues to future generations (S12). Thus, the government must prioritize climate change in their agenda (S18) and should assume these duties through legislation (S21). The three perceptions admit needing to receive more information about climate change (S9). This information could come from environmental organizations or the media (S31, S7). However, government communication is not perceived as a trustworthy source of information about climate change (S8).

Table 5-3 Consensus statements for Consejos Comunitarios

		1		2		3	
No.	**STATEMENT**	**Rank score**		**Rank score**		**Rank score**	
7*	It is difficult to trust what comes out in the media on the issue of climate change	-1	-0.63	0	-0.42	0	-0.20
8*	I trust what I hear about climate change from government	-1	-0.70	-1	-0.63	-1	-0.70
9	I feel I need more information about climate change	0	0.14	1	0.75	2	0.78
10*	People in modern industrialized countries won't be harm by climate change	-2	-1.31	-3	-1.07	-2	-0.79
12*	It is unfair to leave climate change to be solved by future generations	2	0.92	3	1.07	3	1.36
18	I think climate change should be a priority for our government	2	1.03	2	1.06	0	0.28
21*	The government should take responsibility for legislating on environmental issues a great deal more than it does	1	0.54	1	0.48	1	0.64
31	Environmental organizations scare the public with talk of climate change	-1	-0.49	-2	-0.94	0	-0.14
35	We all have the responsibility for environmental problems	3	1.33	3	1.58	4	2.10

5.3.2 Visions of climate change in Santiago Comaltepec

In the Mexican case, three factors extracted and varimax rotated accounted for 60% of the total explained variance. Table5-4 shows participants defining and sharing views of climate change. No confounder Q-sorts were found in this case. Hence all twenty-one Q-sorts loaded significantly in one of the components. The X´s indicate those persons associated with a particular factor significant at $p < 0.01$

Table 5-4 Rotated factor matrix for Santiago Comaltepec

	PERCEPTION 1	PERCEPTION 2	PERCEPTION 3
PARTICIPANT			
1	0.8336X	0.1062	0.0778
2	0.7033X	0.2860	0.1732
3	0.8475X	-0.0737	-0.1217
5	0.7179X	0.2966	0.0952
6	0.5188X	0.4310	0.2019
8	0.6786X	0.1946	0.3366
9	0.5879X	0.2714	-0.1994
10	0.6238X	0.2157	0.0804
11	0.4821X	0.3890	0.3109
13	0.7395X	0.1016	0.0756
15	0.7520X	0.1805	0.0710
16	0.7086X	0.4870	0.0242
17	0.6182X	0.5006	0.0236
18	0.6626X	0.4662	0.1189
20	0.6632X	0.5347	0.0367
4	0.3376	0.4848X	0.3309
7	0.5252	0.6022X	-0.0204
12	0.1055	0.6829X	0.1707
14	0.0793	0.7950X	-0.2343
19	0.1004	0.4747	0.5756X
21	-0.0152	-0.1268	0.8279X
TOTAL DEFINING Q-SORTS	15	4	2
% EXPL.VAR.	35	17	8

5.3.2.1 Perception 1

The first factor represents the view of 15 people: one woman and 13 men whose age ranged from 21 to 62 years old (32.2 years old in average).One participant preferred not to mention gender. Participants loading significantly on this factor acknowledge that nature is fragile (S36) and resources on Earth limited, so humans should learn how to use them wisely (S34). These principles are the basis for an egalitarian worldview. However, they recognize that sometimes natural resources in their territory are misused (S33), and people think in the short term (S6).

Respondents are certain about the existence of climate change. They perceive it as a major environmental issue (S39) that should not be left to future generations (S12). Hence, it should be tackled globally (S27, S37) and should be a priority on the political agenda (S18, S21). They do not perceive disagreement among scientists about climate change (S19), and they positively value the role of media in communicating about climate change (S3).

Despite thinking that climate change (S23) will not affect culture and traditions, they assess it as potentially having disastrous consequences for their territory (S29). The importance

attached to the government, the need to change attitudes of industrialized countries and the fact that people will act only when they feel threatened indicate that they prefer hierarchical management. They believe that people will act to tackle climate change only when they feel threatened (S26). To increase awareness, they think it is necessary to establish more educational programs (S5).

Participant 10: *It is necessary to foster the culture of not littering anywhere and saving water.*

5.3.2.2 Perception 2

Four people held this perception in the Mexican community a woman and three men age ranging from 18 to 40 years old, (average age of 21.3 years old). This perception acknowledges shared responsibility for environmental issues and is characterized by an eco-centric vision of nature and egalitarian standpoint (S35, S15). They strongly agree with climate change being global (S10), and they admit that people think short-sightedly about consequences of their attitudes toward the environment (S6). This contradicts the fact that they fail to consider how climate change may impact future generations (S12). However, they do not think that these changes in the environment will affect their traditions and culture (S23). They believe the community makes proper use of natural resources (S33). They also believe that people will deal with climate change before it affects them (S26). They are satisfied with the level of information they have (S9), and with the way media (S3) and environmental organizations (S31) convey and communicate messages about climate change.

Despite believing that climate change does not need to be a priority on the political agenda (S18), they demand measures for tackling climate change from governments (S21), industrialized countries (S37) and local organizations (S13). The idea was brought up in comments such as:

Participant 7: *This exercise helps me to realize how divorced we are from climate change*

5.3.2.3 Perception 3

A man and a woman, 24 and 31 years old are significantly associated with this factor. Although they believe that sometimes natural resources are misused in their community (S33), they believe that people think about long-term consequences of their actions on the environment (S6). They do not perceive changes in the climate patterns in their territory (S17), but they stress that there is enough information to declare that climate change is real

(S14). For them, climate change could bring some positive consequences to their community (S11), affecting aspects of their culture (S23). Consequently, there are no issues that will negatively affect future generations (S12). They offer minimal insight into actions to care for the environment, and they do not consider it important to deal with climate change to preserve the environment (S2). This group believes people in industrialized countries have little to do with climate change. Not only do they think that they will not be affected (S10) but also that whatever they do to deal with climate change will be useless (S37).

They consider there is enough information to assert that climate change is real. They do trust neither media (S7) nor science as information sources of climate change (S3). Instead, they look favourably upon what comes from the government and perceive it as a trustworthy source of information (S8). Moreover, they are happy with the role legislation plays on climate change issues (S21). Nevertheless, they highlight that climate change should be on the political agenda (S18).

5.3.2.4 Areas of consensus

The areas of consensus between the visions of climate change are shown (Table 5-5). Significant levels are the same as for the Consejos Comunitarios. People in Santiago Comaltepec are concerned about the environment (S40). They have a neutral position on the responsibility for climate change (S1) and how the environment has changed in the last years (S38). They concur that there is no need for demonstrating that climate change has anthropogenic origins to act to stop it. The three perspectives agree with the fact that is better to be safe than sorry regarding talking about climate change (S24, S29). For them, humans can reverse the effects of climate change (S20) even though is not under their control. They reject the idea that industries are needed to keep the economy running (S30). They do not take a clear stand on what is said by scientists (S32) or on messages delivered by environmental organizations (S31).

Table 5-5 Consensus statements for Santiago Comaltepec

NO.	STATEMENT	1		2		3	
		Rank	score	Rank	score	Rank	score
1*	I feel guilty about my contribution to climate change	1	0.54	0	0.16	1	0.57
16	The government should have stopped climate change from happening	-1	-0.35	0	0.24	-1	-0.43
20*	People do not need to feel more concerned about climate change issues as these are not under their control	-3	-1.54	-2	-1.14	-1	-0.87
24*	When it comes to changing climate; I´d rather be safe than sorry	1	0.55	2	0.70	1	0.58
28*	Before we do anything, it has to be proven that people cause climate change	0	0.10	1	0.41	0	0.00
29*	If we don't act now, climate change will lead us to disaster	1	0.71	2	1.13	2	0.88
30*	We need industries and fossil fuels to keep our economy running	-2	-1.28	-3	-1.18	-2	-0.88
31	Environmental organizations scare the public with talk of climate change	-2	-1.00	-1	-0.41	-3	-1.31
32*	I trust what scientist say about climate change	-1	-0.54	0	-0.35	-1	-0.73
38*	The environment in my community has changed considerably over recent years	0	0.02	0	-0.11	1	0.58
40	I am very concern about the environment	2	0.72	1	0.65	-1	-0.15
41	Industries should use new technology to become more efficient and help stop climate change	2	0.75	1	0.35	0	-0.14

5.4 Discussing and constructing visions of climate change

Following it is presented which are the different views of climate change in the territory. The perception types are discussed and compared for each case study.

As anticipated, climate change perspectives are homogenous neither within nor between case studies. Their views on nature, impacts, responsibility, information and managing climate change though having common elements, were despair. Visions of climate change are articulated in three topics. Starting with, how concerned they are about nature and climate change impacts. Then, how and what to communicate about climate change and finally, what their preferences are managing climate change-related issues. Even though the theory was not created with that purpose and the standard methods based on a cultural index for each typology of assessing were not used, the topics are discussed based on the ideas and precepts of this theory (Chandran et al. 2015).

Figure-5-9 and Figure 5-10 summarize perception of climate change for each of the case studies.

As observed in Consejos Comunitarios perception 1 gathers most of the participants. With the exception of perception 3, the age range is broad being difficult to categorize each perception according to age groups. The visions of nature coincide mostly with an egalitarian perspective with the exception of the individualist idea of the perception type 2. The individualist vision is consistent in information and trust, management and impacts.

Figure-5-9 Visions of climate change in Consejos Comunitarios

	Perception 1	Perception 2	Perception 3
Demographic profile	Eleven participants: 4 women, 7 men (age range: 23-60 years old).	Five participants: 4 women, a man (age range: 26-55 years old))	Three participants: women (aged 34, 46 and 49 years old
Nature	*Egalitarians* Nature is fragile and delicate Natural resources are limited Nature has changed in recent years Knowledge of the nature	*Individualists* Concern about environment Natural resources are abundant Free use of natural resources	*Egalitarians* Different rights granted for plants and animals Natural resources are limited Nature can adapt from harm done by humans
Concern and responsibility	Certainty of climate change No individual responsibility for climate change assumed People should be more concerned about climate change	No firm position about certainty of climate change No individual responsibility for climate change assumed Not concerned about climate change Climate change should not be left to future generations	Certainty of climate change Individual and collective responsibility for climate change assumed
Impacts	Disastrous consequences Plants, animals, culture and traditions affected People in industrialized countries will suffer the impacts No changes in weather patterns in their territory	Positive consequences People in industrialized countries will suffer the impacts No changes in weather patterns in their territory	No disastrous consequences People in industrialized countries will suffer the impacts No changes in weather patterns in their territory
Information and trust	*Hierarchists* Trust science as information source Agreement among scientists Positive assessment of media and environmental organizations as information sources Personally needing more information	*Individualists* Mistrust science as information source Not enough information to ascertain occurrence of climate change Positive assessment of media and environmental organizations as information sources Personally needing more information	*Hybrid type: Hierarchists and egalitarians* Mistrust science as information source Disagreement among scientists Need to demonstrate the anthropogenic origin of CC Positive assessment of media and environmental organizations as information sources Personally needing more information
Management	*Hierarchists* Precautionary and foresighted attitude Climate change should be a priority for the State Municipality should be ready for acting People in richer countries should be more involved	*Individualists* No requirement for the local government to act Immediate actions required Industries should be involved by using sustainable technologies	*Hierarchists* Climate change can be controlled Climate change should be a priority for the State Precautionary and foresighted attitude Not requirement for industrialized countries to act Municipality should be ready for acting Industries should be involved by using sustainable technologies Local people should be involved

Source Own elaboration

In Santiago Comaltepec (Figure 5-10) the majority of participants are grouped in perception 1, gathering people with different ages. The vision of nature is similar for two of the perception types as well as the preferred management strategies.

Figure 5-10 Visions of climate change in Santiago Comaltepec

	Perception 1	Perception 2	Perception 3
Demographic profile	Fifteen people: a woman and 13 men (age range: 21-62 years old), one participant preferred not to mention gender.	Four people: a woman and 3 men (age range: 18-40 years old).	A man and a woman, 24 and 31 years old
Nature	*Egalitarians* Nature is fragile and delicate Natural resources are limited People think short term about the environment	*Egalitarians* Nature is fragile and delicate People think short term about the environment	People think long term about the environment
Concern and responsibility	Certainty of climate change Misuse of natural resources in their territory People should be more concerned about climate change Climate change should not be left to future generations	Certainty of climate change Good use of natural resources in their territory Collective responsibility for environmental problems People should be more concerned about climate change	Certainty of climate change Misuse of natural resources in their territory People should be more concerned about climate change No issue in leaving CC for future generations
Impacts	Culture and traditions not affected Disastrous consequences People in industrialized countries will suffer the impacts	Culture and traditions not affected People in industrialized countries will suffer the impacts	Positive consequences Culture and traditions affected People in industrialized countries will not suffer the impacts No changes in weather patterns in their territory No use for richer countries to deal with climate change
Information and trust	*Hierarchists* Mistrust science as information source Mistrust government as information source Enough information to ascertain the occurrence of climate change Positive assessment of media as information source	Mistrust government as information source Enough information to ascertain the occurrence the existence of climate change Positive assessment of media and environmental organizations as information source Personally not needing more information	*Egalitarians* Mistrust science as information source Trust government as information source Enough information to ascertain the occurrence of climate change Negative assessment of media as information source
Management	*Hybrid type: hierarchists and egalitarians* Priority on the political agenda Climate change should be a priority for the State Industries could be involved by using sustainable technologies People in richer countries should be more involved Grassroot actions	*Hybrid type: hierarchists and egalitarians* Government should be better involved in climate change issues Industries could be involved by using sustainable technologies Municipality should be ready for acting People in richer countries should be more involved Grassroot actions	*Hybrid type: hierarchists and egalitarians* Priority on the political agenda Climate change requires immediate action

Source: Own elaboration

A comparison of the results in Santiago Comaltepec and Consejos Comunitarios reveals that most of the participants have an egalitarian view of nature, acknowledging it as fragile and requiring care (except for one Colombian perception which perceives it as abundant, maybe due to the richness of natural resources in the area).

The cultural vision of nature does not cohere with the vision for climate change management actions. This fact shows the complex assembly of configurations that make up a viewpoint. Some participants preferred a hierarchical view. Hierarchical management could be effective in cases when there is a lack of voluntary association (Douglas and Wildasky 1982) or when people fail to recognize the global responsibility of climate change, as in the Colombian case.

5.4.1 Concern for nature

In both Santiago Comaltepec and Consejos Comunitarios an egalitarian view of nature predominated: fragile and ephemeral. This was expected given their links and dependence on nature (Solis Mecalco and Salvatierra Izaba 2012). The richness of natural resources in the area could explain the individualist view in the Colombian case study. Nature would be for them abundantand resilient. None of the perceptions matched the fatalist cultural type. Other studies of collective action showed similar results including the individualist cultural type as residual (Pendergraft 1998).

For both case studies it is clear that climate change is occurring. However, the anthropogenic-related aspects are still undervalued both at concern and responsibility levels. People in both cases pursue increasing awareness of climate change in line with a conservation attitude, especially in Santiago Comaltepec. However, individual responsibility for contributing to climate change is still not widely assumed (only the people holding perception 3 in Consejos Comunitarios assume it). Hence, dealing with climate change could be complex because people in both case studies fail to recognize that some aspects of resource management and human intervention in nature might entail danger. Some of these activities could be changes in land use for agriculture and mining activities in Consejos Comunitarios, or the expansion of agriculture in forested areas in Santiago Comaltepec.

Neither people in Santiago Comaltepec nor Consejos Comunitarios identified changes in weather patterns in their territories, nor did they believe that climate change would affect them directly. For many of them the consequences will be seen only in developed countries. Only people holding the view of perception 1 in both case studies see disastrous consequences. Moreover, for the rest of participants the effects of climate change are not disastrous and could even positively impact on their communities; similar results were found by Norgaard (2011). The results show a lack of viewing and understanding climate change impacts, what contrasts with IPCC predictions for these countries. In the face of negative repercussions, climate change could undermine internal community mechanisms (World Bank 2008). In both cases, where ethnic and traditional aspects are so important, this could make traditional ecological knowledge inadequate for the new rhythms of nature. Moreover, it could affect livelihoods options.

5.4.2 What and how to communicate?

The fact that communities do not spot changes in the environment but assert climate change as real, could indicate that most individuals may relate to climate change not only

through individual experience but also through knowledge (Lorenzoni and Pidgeon 2006). For Howe and Leiserowitz (2013) recognising climate change depends not only on personal experience but also on prior beliefs about it. Therefore, the content and information sources on climate change are essential for creating opinion. In the light of the results, information should clearly show the anthropogenic influence on climate change and deliver context-adapted information of climate change consequences, maybe by using visual methods or real examples from their territory. At community-level it could be a troublesome issue. Often information at local scale either is not available or not updated.

The results also provide relevant insights about the information sources preferred by the participants. Reliable sources of information of climate change are those from the nearby environment. People's social ties are a good indicator of the kind of information people have access to and the sources they use (Smith et al. 2012). People fitting in the egalitarian cultural type are expected to use bonding sources (people in closed), as they trust peers. However, results show that the preferred sources of information in both cases are more related to bridging connections, for example, environmental organizations. This should not be surprising given the communities tradition based on trust of work with NGOs and civil society organizations. The positive assessment of NGOs and media can be considered a valuable asset, provided they deliver accurate information. The lack of trust in science and governments is a warning sign that should not be overlooked. In all cases, the communication about climate change should be consistent with the cultural biases and preferences (Steg and Sievers 2000).

5.4.3 Successful management

Preferences on issues related to climate change management align with egalitarian and hierarchical cultural biases. Hierarchical and egalitarian cultural types form the preferences for climate change management in Santiago Comaltepec. In Consejos Comunitarios, two perceptions fit the hierarchical worldview, and one the individualist (being consistent with the view of nature and climate change management cultural type).

Both in Santiago Comaltepec and Consejos Comunitarios a horizontal and a vertical assembly managing climate change coexists. That is to say by including people and top-down approaches. Both types differ in respect to the behavior imposed from the outside and the institutions involved in the management and implementation of adaptation strategies to climate change. However, both cultural types acknowledge climate change as a

moral and ethical issue (Thompson 2003). This would explain why for many participants climate change should be included as a priority in the political agenda.

In both cases, traditional ways of social organization and natural resource management are not aligned with the preferred visions of climate change adaptation and mitigation strategies. The implications are not minor because this determines the role that people in Santiago Comaltepec and Consejos Comunitarios would play in adapting and even mitigating climate change.

As principles of CBNRM, trust and reciprocity are the foundations of social structure in both case studies. However, Consejos Comunitarios and Santiago Comaltepec differ in how they take decisions being horizontal and vertical respectively. People in Santiago Comaltepec value their managing and social organization regimes, given perhaps to the long tradition of managing the territory and the sustainable management it has delivered. It is also worth mentioning that only people in Santiago Comaltepec show the possibility that resources in their territory are mismanaged. This contrasts with the fact that the community is recognized for having an environmentally sustainable use of its forest (Chapela 2007). Even if the social organization is rather hierarchical there, people favored an egalitarian worldview of addressing climate change. There they expect the government to be involved, but they demand space for participation. People understand they have the capabilities and skills that have long helped them manage the forest sustainably. In Consejos Comunitarios, the newly implemented CBNRM, the role played by governmental institutions in the management of the territory, their difficulties to implement rules and to recognize institutions make people more inclined to a hierarchical management of climate change. This implies the participation of the State together with technical knowledge.

Results show that people gave equal importance to both the municipal and the national levels of interventions. People in Consejos Comunitarios stress the role of hierarchically structured institutions coinciding with the viewpoints of other indigenous Colombian communities (Pinilla Herrera et al. 2012) while in Santiago Comaltepec advocate grounded actions were also mentioned.

To be consistent with the egalitarian view of nature and to increase the effectiveness of climate change-related actions the hierarchical management should protect and incorporate local knowledge on how communities understand nature and culture. This means that interventions need to be immediate and should respect the social norms and the traditional "ways of doing" prevailing in the communities. It would be opportune to combine national

commitments and expert knowledge (hierarchical type) with local knowledge and grass-roots actions (respecting the egalitarian cultural type).

Chapter 6

THE QUANTITATIVE SIDE OF CLIMATE CHANGE PERCEPTION

This chapter reports the results of the questionnaire and the "quantitative" association and predictions of climate change perception. Statistical analysis was performed for each case study. Due to the small sample size, when results were not significant, the analysis was executed clustering databases of both Santiago Comaltepec and Consejos Comunitarios together. Only when indicated, results and analysis is presented separately for each case study. The first section describes aspects of cultural theory and how the theory applies in perceiving climate change in CBNRM contexts. Secondly, the analysis was undertaken through NEP scale to explore environmental attitudes and influences in climate change perception. Thirdly, aspects of psychological distance are examined. This chapter finishes with exploring ideas about uncertainty and scepticism of climate change among participants. It is presented in a separate section but is closely related to aspects of psychological distance.

6.1 Identifying the influence of worldviews on perceiving climate change

6.1.1 Reliability and Validity analysis for cultural theory items

In this section, results about the methodological test of cultural theory (Q12, Q13) are assessed. This analysis helps to test the theoretical validity of cultural theory for in contexts such as the one in the study.

Cultural biases were operationalised by combining the items of the questions above mentioned for each of the four cultural biases. Results from the analysis can be seen in Table 5 to Table 10 and Figure 1 in Appendix 4.

In the case for Santiago Comaltepec, exploratory PCA showed an ideal number of 7 factors accounting for 81% of total variance. Following, to test compliance with theory, confirmatory PCA was performed extracting four factors this explaining 60.58% of total variance. KMO test was not calculated as the correlation matrix was non-positive definite maybe due to the number of missing values.

In Consejos Comunitarios, the exploratory PCA solution showed seven factors extraction accounting for 72% of the total variance explained. To test theory the confirmatory PCA with the 4 factor solution accounted for 54.10% of the total variance explained with a KMO =.304.

Results were better when clustering data bases. In the exploratory PCA, it shows an initial solution of 7 factors accounting for 71% of total variance explained. Confirmatory PCA with fours factor extracted showed 52.681% of total variance explained. KMO= .538.

To check on the reliability of the scales in the Mexican case (n=30) two indexes were successfully constructed egalitarian Cronbach´s α=.803 and fatalism Cronbach´s α=.768. Individualist and hierarchy indexes failed to achieve a satisfactory Cronbach´s α. For the Colombian case study (n=39) is only the fatalism index Cronbach´s α=.775 that performed successfully. The scale is bear significant for the global analysis, yielding a value of Cronbach´s α=.517 for the hierarchical index, fatalists index Cronbach´s α =.796, egalitarian index Cronbach´s α=.718, only the individualist index did not show a satisfactory Cronbach value .

In order to examine the nature of the items, hierarchical cluster analysis by variables was performed (Marris et al., 1998). The analysis was done separately for the Mexican and Colombian communities and both data bases together. The Santiago Comaltepec analysis

revealed two clusters. One of them clusters the egalitarian items, and another grouping fatalist items together. Individualists and hierarchical items are mixed. The Colombian hierarchical cluster analysis showed two clusters as well, where fatalist items grouped together with two individualist items. The remaining individualist items and the other two cultural biases formed another cluster. Grouping both data bases analysis showed two clusters as well. Fatalist and individualist items are grouped together while egalitarian items formed a separated cluster. Hierarchical items were distributed into both clusters. Results of the cluster analysis can be seen in Figure 1 Appendix 4.

6.1.2 Exploring cultural bias

Correlation analysis was performed to see how cultural theory scales related to each other. In Consejos Comunitarios egalitarian scale correlates with fatalism ($r=.514$, $p>.05$). No significant relation was found for the cultural theory scales in Santiago Comaltepec. To test whether the effect of sample size was influencing the result, the correlation of joining databases demonstrated that hierarchy was correlated with individualism ($r=.426$, $p>.01$) and fatalisms ($r=.245$, $p>.05$). Egalitarianism did not show any relation to the scales.

6.1.2.1 Cultural bias at individual level

The analysis was conducted separately for each case study to explore individual cultural bias. Four cultural bias scores were calculated for each of the respondents by adding up scores given by the respondent for the items assigned to each cultural bias. This resulted in a score between 1 (not at all agree) and 4 (strongly agree). The cut point was established at three this representing the score from which people start agreeing with one specific item. Scores can be seen in Table 4 Appendix 4.

Given the analysis procedure, the respondents would be projected to have a high score in one particular bias, therefore being egalitarian, fatalists, individualist, or hierarchical. However, results differ from expected. If looking at individual score per cultural bias, the majority of people from Consejos Comunitarios respondents had scores above for more than one cultural bias (Table 6-1). Thirty-one participants out of the 39 score higher in more than one cultural bias while only six of them score in just one cultural bias, egalitarianism. Two respondents are found to have no cultural bias. For the overall case of Consejos Comunitarios, individual higher scores were given to egalitarian cultural type (Table 4 Appendix 4). In the Mexican case study, the situation is rather different. Five respondents were classified as pure types, one hierarchical and four egalitarians. In the Mexican case study, six participants have a mixed cultural bias while 23 are all pure egalitarians. Three

participants score higher in both egalitarian and hierarchy, two as egalitarian and individualists and one respondent as and individualist, hierarchists and fatalist. One person has no defined cultural bias (Table 4 Appendix 4)

Table 6-1 Number of participants by cultural bias I

	Santiago Comaltepec	Consejos Comunitarios
Egalitarian	23	6
Fatalist	-	-
Egalitarian and Hierarchists	3	17
Egalitarian and individualist	2	2
Egalitarian, Hierarchists and fatalist	1	10
Individualist, Hierarchists and fatalist	-	1
Egalitarian, Hierarchists, fatalist and individualist	-	1
No type	1	2

Following with classifying individuals within a single cultural bias, three conditions were applied as stated in 4.4.3.2.1 in the Methodology chapter.

Applying criteria "a", allow for classifying 12 individuals in Consejos Comunitarios and one person in Santiago Comaltepec, this one being egalitarian. Six individuals are fatalists, three hierarchists, two individualists, and one egalitarian.

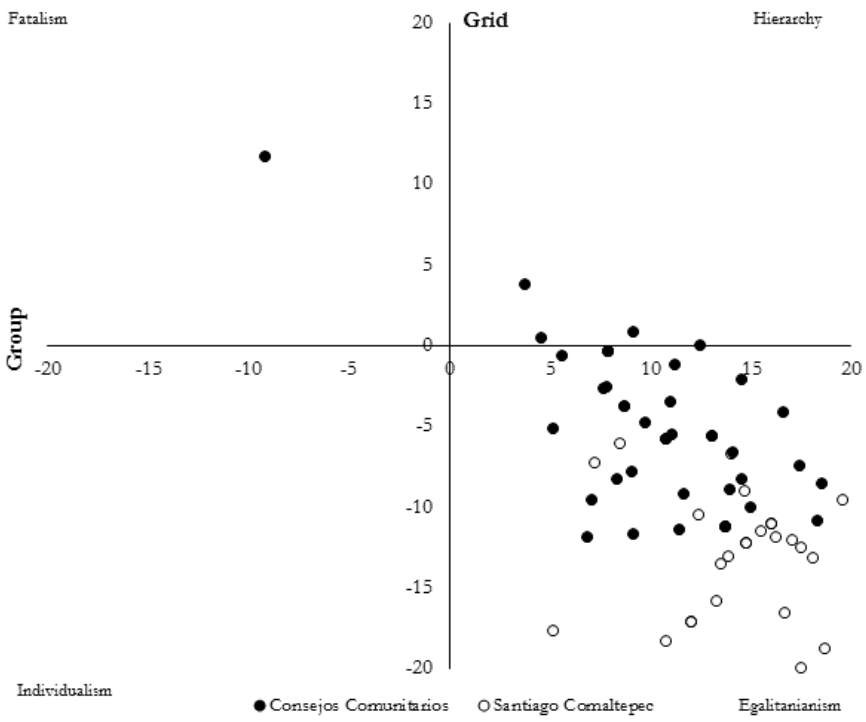
Criteria "b" shows worse results, as it only succeeds in classifying five participants in Santiago Comaltepec and two in Consejos Comunitarios, these being egalitarians. In Santiago two individuals are hierarchists and the rest are equally distributed among cultural bias. Lastly, criteria "c" succeeds in classifying individuals in Santiago Comaltepec, a total of 11 participants. According to this condition five are Hierarchists, three individualists, two egalitarians and one fatalist. The results reinforce the idea that it is very difficult to categorise people within one single group, people are permeable and not stable.

Table 6-2 Number of participants by cultural bias II

CULTURAL BIAS	CRITERIA					
	A		**B**		**C**	
	Santiago Comaltepec	**Consejos Comunitarios**	**Santiago Comaltepec**	**Consejos Comunitarios**	**Santiago Comaltepec**	**Consejos Comunitarios**
PURE INDIVIDUALISTS	0	2	1	0	3	0
PURE HIERARCHISTS	0	3	2	0	5	0
PURE FATALISTS	0	6	1	0	1	0
PURE EGALITARIANS	1	1	1	2	2	0
TOTAL PURE CULTURAL BIAS	*1*	*12*	*5*	*2*	*11*	*0*

Despite the difficulty in categorizing people in one single bias, it was possible to see how they were located within the grid-group model. To calculate the attachment to the group (X axis) scores on egalitarianism and hierarchy were summed, and scores on fatalism and individualism subtracted. The degree to which a person is conditioned by external rules (grid) was calculated by adding scores on fatalism and hierarchy and subtracting the scores for egalitarianism and individualism. The Figure 6-1 exhibits that most of the participants are allocated within the quadrant of egalitarianism and some of them in the border with hierarchism. One individual would be assigned in the fatalist quadrant.

Figure 6-1 Participants distribution in the grid-group model



Source Own elaboration

6.1.3 Cultural bias and climate change

6.1.3.1 Cultural bias and sociodemographic factors

In this section, the influence of sociodemographic factors (Q1, Q2,Q3,Q36) and cultural theory is presented. The analysis was assessed by MANOVA analysis and using Pillais' trace for n=69. In light of the results obtained from the reliability and validity analysis of the scales, subsequent analysis with cultural theory scales were done with the index created through mean scores. Results of the analysis can be seen in Table 11 to Table 16 in Appendix 4. Results showed that country and ideology influence on scoring at cultural theory scales. Because groups significantly differed in term of provenance, including this one as a covariate would not balance out results as it is still confounded (Miller and Chapman 2001, Field 2009). Subsequent analysis with the sociodemographic factors was not performed with the country as a covariate to see potential differences.

- Country:

There is a significant effect of the country on the scores in cultural theory scales V=0.583, F(4,64) = 22.366. The separate ANOVA analysis on the outcomes variables reveals significant country effects on the fourth cultural theory subscales being: individualism F(1,67)=1.732, p<.05; hierarchy F(1,67)=3,817, p<.05; fatalism F(1,67)=4.516, p<.05; egalitarianism F(1,67)=2.026, p<.05. To fully understand the data discriminant univariate analysis was carried out after ANOVA. The analysis shows one function explaining 100% of the total variance, canonical R^2= .5836. This canonical function significantly differentiates countries λ=.417, $X^2(4)$ =56.848, p<.05. Given the Lambda value (not closer to one), the dispersion is due to differences between the group, making distinguishable scores on countries. The correlation between outcomes and the discriminant function reveals that all the scale but egalitarians load moderately on the function. Also, variate 1 distinguishes Colombia from Mexico case studies.

Means score on the cultural theory scales are higher for the respondents in Consejos Comunitarios.

- Age categories:

The effect of age in scoring in cultural theory scale is not significant at p>.05 using Pillai's Trace: V=0.133, F (8,128) =1.144. Separate univariate analysis corroborate this result: individualism F(2,66)=.236, p>.05; hierarchy F(2,66)=.177; fatalism F(2,66)=.861, p>.05; egalitarianism F(2,66)=.031,p>.05.

There is no significant effect of age in scoring in any of the cultural theory scales. For individualists, higher scores are among young people, hierarchy and fatalism have higher scores among elder people, while middle-aged have the highest score for egalitarians.

- Gender:

The analysis shows no significant effect of gender on the scores in cultural theory scales V=0.069, F(4, 64) =1,183, p>.05. Separate univariate analysis verifies the same result: individualism F(1,67)=.053, p>.05; hierarchy F(1,67)=.112; fatalism F(1,67)=1.471 p>.05; egalitarianism F(1,67)=.048, p>.05.

Means score on the cultural theory scales are equal for both men and women.

- Educational Level:

There is a significant effect of educational level on the scores in cultural theory scales. V=.258, F(8,126) =2,332, p<.05. The ANOVA analysis validate result only for: egalitarianism F(2,65)=.100, p<.05. The discriminant analysis shows two functions. The first one explains 68.1% of variance, canonical R^2 =.17, second function explains 31.9%, canonical R^2= .087. Functions in combination significantly differentiated educational level λ=.757, X^2 (8) =17.68, p<.05. Removing the first function indicates that the second function does not significantly differentiated educational level λ=.912, X^2 (3) =5.822, p>.05. Higher values of Lambda demonstrate that dispersion is due to differences within the groups not between them. Correlations between outcomes and discriminant functions reveal that hierarchy (r=.83) and fatalism (r=.676) loaded in the first function while individualism (r=.787) and egalitarianism (r=.339) do it onto the second one. Functions at group centroid told us that variate one discriminates higher education from primary and middle, while the second variate distinguishes primary and higher education from the middle.

Higher scores are seen in individualism among people with secondary education. In hierarchy and fatalism higher scores are seen in people with primary education. Higher scores in egalitarianism are in people with higher education.

- Ideology:

The analysis shows significant effect on the scores in cultural theory scales: v=.652, F (16,236) =2.875 at p<.05. Separate univariate ANOVA on the outcome variables reveals significant ideology effects on three of the cultural theory scales. Hierarchy F(4,59)=.508 at p<.05; fatalism F(4,59)=.990, p<.05, egalitarianism F(4,59) =.809, p<.05. Discriminant analysis was carried out to understand better the relation between the cultural theory scales. The analysis shows three discriminant functions. The first one explaining 58.9% of the variance, being canonical R^2 =.33, the second explains 39.4% of variance, canonical R^2 = .24, whereas the second function explained only 1.7% of variance, canonical R^2 = .01. In combination, these discriminant functions do not significantly differentiated ideology groups λ=.497, x^2(12) =21.652 at p>.05. Second and third function in combination do not differentiate ideology groups λ=.742, x^2 (6) =9.256 at p>.05; again third function alone reveals the same result: λ=.986, x^2(2) =.444 at p>.05. The correlations between outcomes and functions show that hierarchical scale load onto the first function r=.432. Fatalism (r=.669) and egalitarianism (r=.533) correlate with the second function and individualism with the third (r=.747). The discriminant function plot (provided in Table 16 Appendix 4) shows that function 1 discriminates right and centre-left while function 2 did it for left, and centre -left and right centre-right.

Even though ideology played an effect on scoring in the cultural theory scales that differentiated right and centre-left individuals and also left and centre-left from right, centre-right individuals. However, none of the pairwise comparison was significant.

6.1.3.2 Importance of climate change and cultural bias

In the analysis of the attributed importance to climate change (Q21) according to cultural bias (n=69), Consejos Comunitarios shows no significant correlation between cultural bias and importance of climate change.

In Santiago Comaltepec hierarchy is significantly related to importance of climate change (r=.-375) at p<.05. Here, hierarchy significantly predict importance of climate explaining

14% of variance of change R^2=.141. Clustering both databases together, the analysis align with Santiago Comaltepec and significant relation is found with hierarchy (r= -.263). The results of the simple linear regression suggest that the model explain only 6.1% of variance of change (R^2=.061). As the value of importance to climate change increase, the value for hierarchism decreases.

Table 6-3 Regression analysis: hierarchy predicting importance to climate change (Santiago Comaltepec)

	B	SE B	β	R^{2*}
HIERARCHY				
CONSTANT	4,790	3,40		
HIERARCHY	-,269	,125	-,376	,141
*P<.05				

Table 6-4 Regression analysis: hierarchy predicting importance of climate change Grouped databases)

	B	SE B	β	R^{2*}
HIERARCHY				
CONSTANT	4,923	,510		
HIERARCHY	-.356	,170	-,247	,061
*P<.05				

Cultural theory does not predict the importance attached to climate change except for hierarchy when the analysis is performed clustering data bases and in Santiago Comaltepec. The higher the importance to climate change the lower the scores in hierarchy.

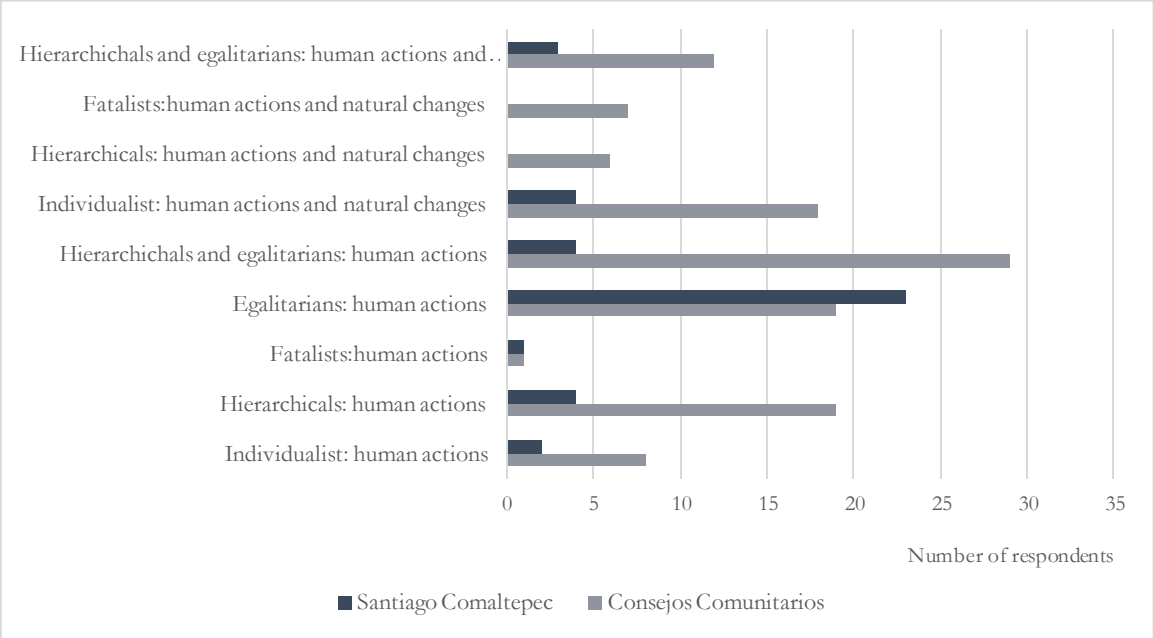
6.1.3.3 Cultural bias and origin of climate change

Here, the relation between cultural theory scales and aspects related to the origin of climate change (Q22) were analysed first with a descriptive analysis and secondly with a *t*-test analysis (n=69). For each cultural type, the cut point was established to be equal or higher than 3. Since people did not fit into one single cultural bias, the total of participants for each case exceeds the amount of the total sample.

In Consejos Comunitarios 9 participants score higher or equal to 3 on individualism and consider that climate change is caused by human actions. In Santiago Comaltepec twenty-three participants acknowledged the human influence on climate change and scored higher in hierarchy, one did it in fatalism, and 43 in egalitarianism (Figure 6-2). In Consejos Comunitarios the majority of people classified as hierarchists and egalitarians considered that climate change is induced by human actions. Here the majority of people holding both

cultural biases attribute causes of climate change to human actions. Much smaller is the number of people that would say that climate change is attributed to both human causes and natural changes in the system (Figure 6-2). More hierarchists were found in Consejos Comunitarios attributing the origin of climate change to humans' actions than in Santiago Comaltepec. In any of the case study, no egalitarian was found that attributed the causes of climate change to both actions and natural changes.

Figure 6-2 Origin of climate change by cultural bias



In addition a *t*-test was applied to see dependence of scoring in the cultural theory scales based on the answer for occurrence of climate change.

On average, there are differences in the mean scores in the cultural theory scales, depending on having answered "yes" or "no" to the statements regarding climate change origin. In any of the cases (Santiago Comaltepec, Consejos Comunitarios, and grouping both data bases) the differences are not significant.

In Consejos Comunitarios, for the four cultural types on average participants score higher when disagreeing with the idea that climate change is happening and it is caused by human actions than when agreeing with the statement. In Santiago Comaltepec the means for the four scales are higher when people agree with the statement. However this difference is not significance in any of the cases. Clustering both data bases, the mean is on average higher for individualism, hierarchy, and fatalism when disagreeing with the idea that humans are

causing climate change. The mean is higher for egalitarianism when agreeing with it (Table 6-5).

Table 6-5 T-test analysis: climate change is happening and it is caused by human actions

	Scale	Agreement with statement	Mean	SD	*t*	Significant*
Consejos Comunitarios	Individualism	Yes	2.72	.444	-.623	No
		No	2.81	.372		
	Hierarchy	Yes	3.12	.277	-.808	No
		No	3.22	.438		
	Fatalism	Yes	1.89	.615	-.401	No
		No	1.97	.744		
	Egalitarianism	Yes	3.20	.308	-.960	No
		No	3.30	.308		
Santiago Comaltepec	Individualism	Yes	2,50	,271	,617	No
		No	2,43	,242		
	Hierarchy	Yes	2,75	,282	2,116	No
		No	2,43	,511		
	Fatalism	Yes	1,46	,449	,116	No
		No	1,44	,270		
	Egalitarianism	Yes	3,63	,449	1,036	No
		No	3,42	,356		
Grouping data bases	Individualism	Yes	2,61	,375	-1,115	No
		No	2,71	,378		
	Hierarchy	Yes	2,92	,335	-,876	No
		No	3,02	,566		
	Fatalism	Yes	1,66	,568	-1,157	No
		No	1,84	,693		
	Egalitarianism	Yes	3,43	,442	,993	No
		No	3,33	,318		
***Significance at p<.05**						

In Consejos Comunitarios and Santiago Comaltepec the mean score is higher in individualism disagreeing with the idea that climate change is mainly due to natural causes, while for the three other scales the mean is higher when agreeing with the idea. If grouping data bases together, the results are the same. In any of the cases the difference is significant (Table 6-6).

Table 6-6 T-test analysis: climate change is happening and it is caused by changes in the natural system

	Scale	Agreement with statement	Mean	SD	*t*	Significant*
Consejos Comunitarios	Individualism	Yes	2.75	.191	-.085	No
		No	2.76	.428		
	Hierarchy	Yes	3.75	.443	4.022	No
		No	3.10	.287		
	Fatalism	Yes	2.65	.767	2.307	No
		No	1.85	.622		
	Egalitarianism	Yes	3.62	.298	2.796	No
		No	3.20	.282		
Santiago Comaltepec	Individualism	Yes	2,36	,049	-,697	No
		No	2,50	,270		
	Hierarchy	Yes	2,79	,014	,404	No
		No	2,68	,366		
	Fatalism	Yes	1,50	,466	,128	No
		No	1,46	,421		
	Egalitarianism	Yes	3,62	,169	,090	No
		No	3,59	,449		
Grouping data bases	Individualism	Yes	2,62	,249	-,172	No
		No	2,64	,388		
	Hierarchy	Yes	3,43	,603	2,952	No
		No	2,91	,385		
	Fatalism	Yes	2,25	,857	2,237	No
		No	1,67	,572		
	Egalitarianism	Yes	3,62	,243	1,439	No
		No	3,37	,411		
***Significance at p<.05**						

Finally, when the origin of climate change referred to both human actions and natural changes in the system, the mean score is higher for individualism when people agree with the statement and higher for hierarchy fatalism and egalitarianism when participants disagree with it. In Santiago Comaltepec and when grouping the data bases, means scores are higher for the four cultural theory scales when people disagree with attributing causes to climate change to both humans and natural changes. In any situation differences are significant (Table 6-7).

Table 6-7 T-test: climate change is happening and it is caused by human actions and natural changes in the system

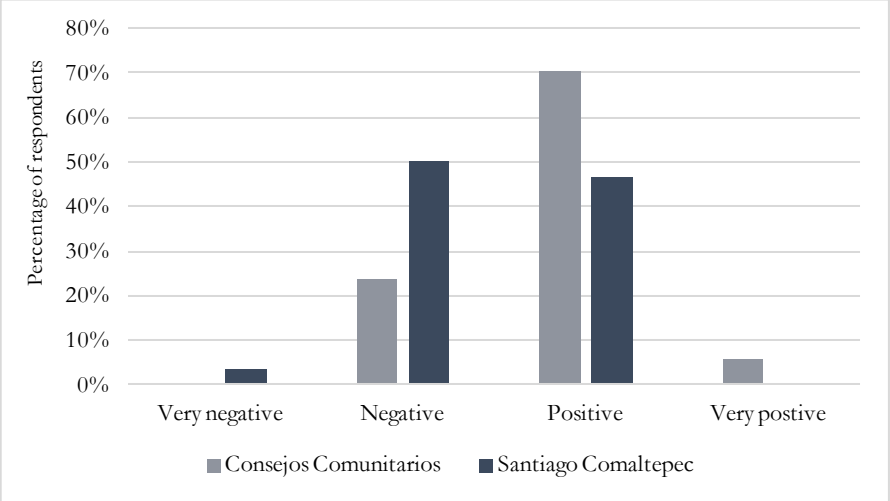
	Scale	Agreement with statement	Mean	SD	*t*	Significant*
Consejos Comunitarios	Individualism	Yes	2.87	.446	.504	No
		No	2.74	.398		
	Hierarchy	Yes	3.03	.317	-1.641	No
		No	3.23	.364		
	Fatalism	Yes	1.64	.571	-1.852	No
		No	2.05	.680		
	Egalitarianism	Yes	3.22	.263	-.316	No
		No	3.25	.330		
Santiago Comaltepec	Individualism	Yes	2,40	,340	-,605	No
		No	2,50	,259		
	Hierarchy	Yes	2,06	,503	-3,930	No
		No	2,76	,266		
	Fatalism	Yes	1,33	,165	-,562	No
		No	1,47	,434		
	Egalitarianism	Yes	3,27	,479	-1,345	No
		No	3,62	,424		
Grouping data bases	Individualism	Yes	2,73	,450	1,009	No
		No	2,62	,354		
	Hierarchy	Yes	2,84	,524	-1,259	No
		No	2,99	,396		
	Fatalism	Yes	1,58	,525	-1,048	No
		No	1,76	,637		
	Egalitarianism	Yes	3,23	,296	-1,794	No
		No	3,44	,420		
*Significance at p<.05						

Even though on average the mean score for the four cultural theory scales are different based on the source of occurrence of climate, these differences are not statistically significant.

6.1.3.4 The role of the State in dealing with climate change and cultural bias

The relation of people with the State, people were asked on their feelings about the State (Q35) for a sample of n=69Seventy percent of people in Consejos Comunitarios have positive feelings about the State and 23,5% negative. In Santiago Comaltepec the situation is balanced: higher percentage of people have negative or very negative feelings about the state, and 46% positive feelings.

Figure 6-3 How do people feel about the State?



Additionally regression analysis was performed to study feelings about the State per cultural bias. The results show that in Consejos Comunitarios, individualism significantly correlates at p>.05 (r=.317) and significantly predict it, explaining 10% of the variation of the model, corresponding to R^2=.101 in Table 6-8 In Santiago Comaltepec, correlation is found to be significant for fatalism (r=.528) at p<.01 and significantly predicts the feelings a person could have for the State, explaining approximately 27% of change in the variation of the model (corresponding to R^2=.279 in Table 6-8). For both data bases together, results showed no significantly correlation with regard feelings about the State. Results can be seen in Table 24 to Table 28 in Appendix 4.

Table 6-8 Regression analysis: individualism predicting feelings about the State (Consejos Comunitarios)

	B	SE B	β	R^{2*}
INDIVIDUALISM				
CONSTANT	-.493	2.084		
INDIVIDUALISM	1.449	.743	.317	.101
***P<.05**				

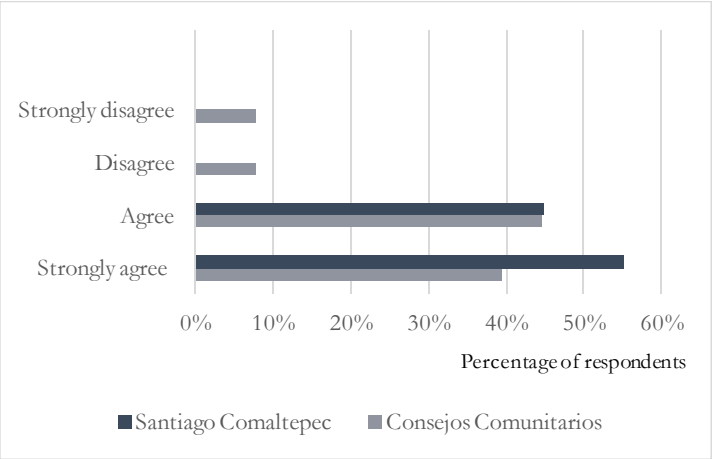
Table 6-9 Regression analysis: fatalism predicting feelings about the State (Santiago Comaltepec)

	B	SE B	β	R^{2*}
FATALISM				
CONSTANT	1.396	.339		
FATALISM	.703	.222	.528	.279
***P<.05**				

In Consejos Comunitarios the higher the scores on individualism the more positive the feelings about the State are. In Santiago Comaltepec the higher the scores on fatalism the more positive the feelings about the State are.

The cultural theory was also used to explore how participants perceived the role of Mexican and Colombian States to address climate change (Q24). From the total valid responses (n=69), 88.23% agree or very much agreed with the idea that both Colombia and Mexico governments could deal with climate change. Figure 6-4 shows the percentage of respondents agreeing that the State (Colombia or Mexico) could deal with climate change in the current situation. People in either Consejos Comunitarios or Santiago Comaltepec agree or strongly agree with the idea that the State could deal with climate change in the current situation. Yet a small percentage of respondents in Consejos Comunitarios is at odds.

Figure 6-4 The State can deal with climate change



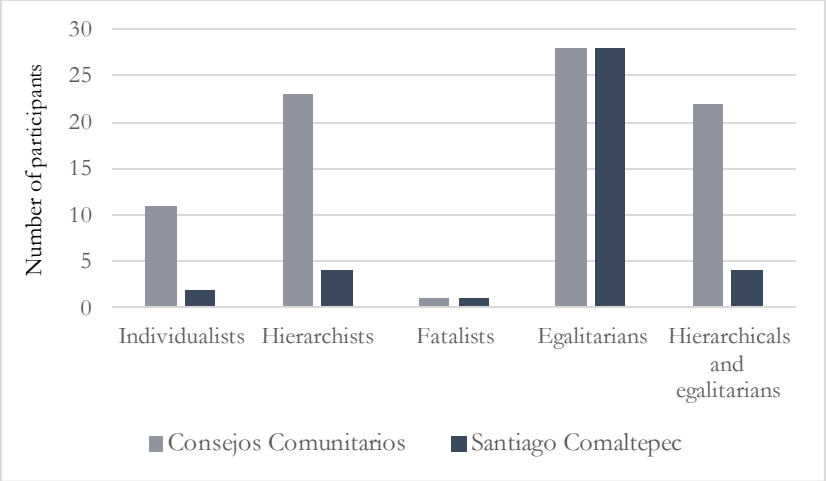
The role of the State with regard to climate change was also explored according cultural typology. For an individual to be from a particular cultural bias, the score for any particular bias was established to be equal or higher than 3. In this case, results are presented grouping data from both case studies.

It was not possible to characterise people in one cultural bias therefore numbers of participants in the analysis presented exceed the amount of the total sample.

From the total sample of participants (n=69) fifty-six participants scored higher for egalitarianism and considered that the State could afford to deal with climate change, 26 did it for hierarchical, 13 people in individualism and one person for fatalism. For the total respondents scoring high in egalitarianism and hierarchy (n=33), 25 of them consider possible for the State to deal with climate change in the current situation.

Figure 6-5 shows participants per case study considering that the State, currently can afford dealing with climate change according to cultural bias.

Figure 6-5 Cultural theory types and responsibility of the State



Correlation analysis was carried out to explore the relation between cultural theory scales and the degree of which a person considered that Colombian and Mexican Governments could affords dealing with climate change. However, the degree of which a person considered the State could afford to deal with climate change was not significantly correlated with none of the cultural theory scales (Table 29 to Table 31 in Appendix 4).

No significant correlation is found in the case of participants neither from Consejos Comunitarios nor Santiago Comaltepec .

6.1.3.5 Cultural bias and preferred sources of information of climate change

Level of trust and usual sources of information about climate change (Q32, Q33) were examined in relation to cultural bias. The analysis was done with both data bases together, considering egalitarian and hierarchical cultural biases. Total sample n=69. The cut point was established for the mean scores to be higher or equal to 3 for each cultural bias.

From the 48 participants indicating to use media as an information source of climate change, 47 score higher in egalitarianism while 26 do it for hierarchism. Results show that 18 participants prefer the internet, 17 of them scored higher in egalitarianism and eight in hierarchy. Seventeen people use environmental organizations, 16 of them being egalitarians and ten hierarchical. People from the immediate surroundings were only chosen by 16 participants, 14 of them having scored higher in egalitarianism and 3 of them in hierarchy. Table 6-10 below shows results in percentage for participants who scored higher in egalitarianism and hierarchy.

Table 6-10 Used sources of information by cultural bias

	CULTURAL TYPE	
	Egalitarianism	Hierarchicals
MEDIA	96%	54%
INTERNET	94%	44%
ENVIRONMENTAL ORGANISATIONS	94%	59%
PEOPLE AROUND THEM	88%	31%

For the egalitarians and hierarchists in both case studies confidence is lower for public actors (municipality, the President, Health Ministry) and weather forecast. Environmental organisations and scientists are the most trusted sources of information for both egalitarians and hierarchists. In Consejos Comunitarios for egalitarian participants Radio, TV, and Media are trusted sources of information. Figure 6-6 and Figure 6-7 show participants trusting information sources per cultural type and case study.

Figure 6-6 Trust in information sources: egalitarian participants

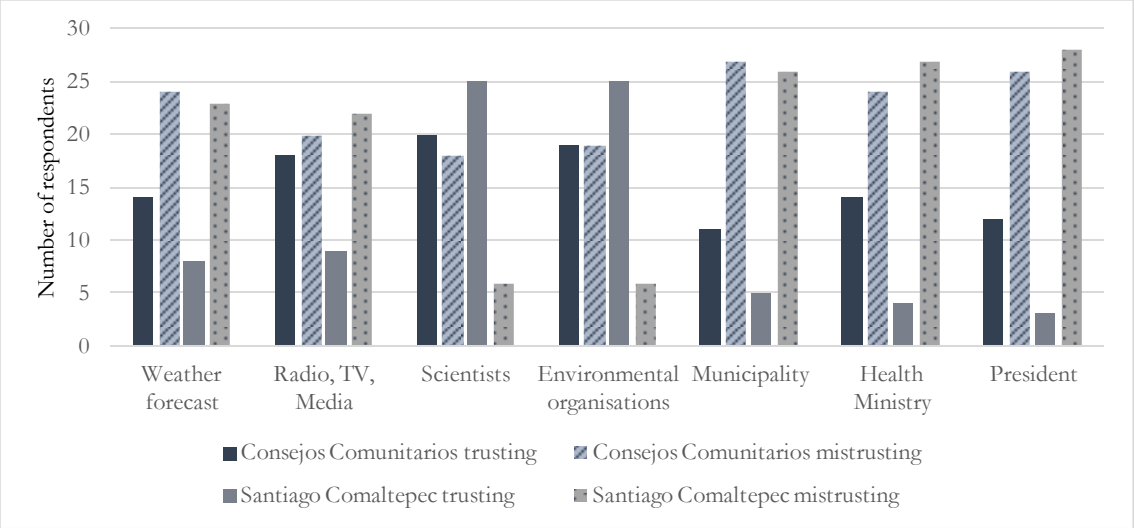
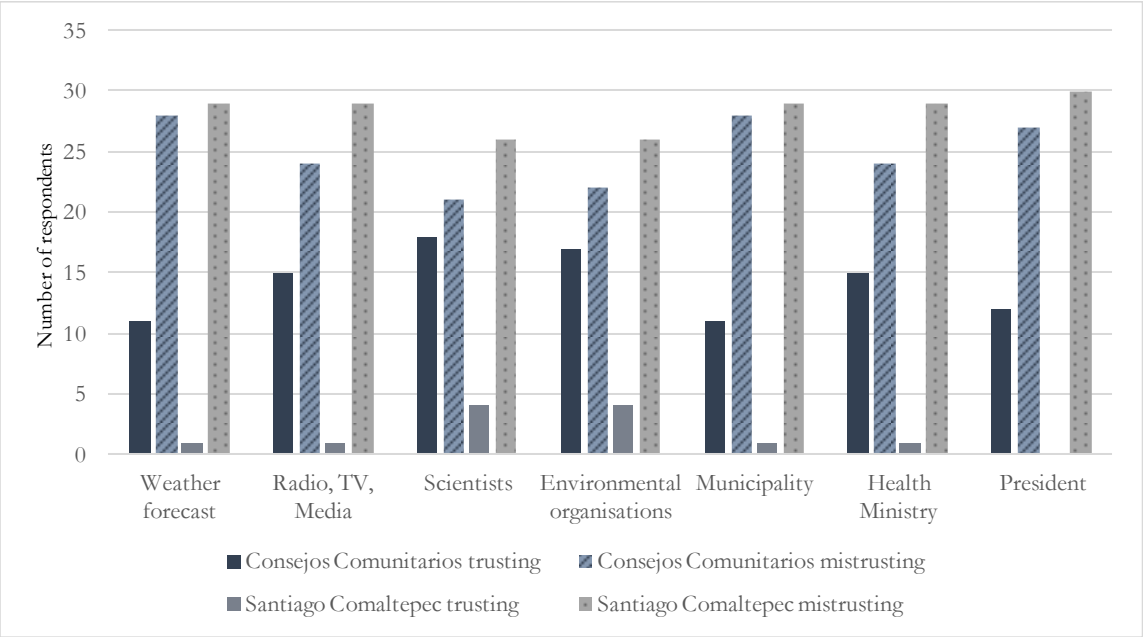


Figure 6-7 Trust in information sources: hierarchical participants



6.1.3.6 The risk characteristics of climate change and the cultural bias

In this section, the five aspects related to risk perception (Q25, Q26, item 26.7, Q29, Q34) in the questionnaire are examined in view of cultural theory for a total sample of n=69. Output of the statistical analysis can be seen in Table 32 to Table 48 in Appendix 4.

❖ Catastrophic potential

The catastrophic potential was analysed correlation analysis shows that the variable catastrophic potential is significant correlated with egalitarianism (r=.27, p<.05) but no significant relation is found between the other cultural theory scales at this significance level. In Consejos Comunitarios, the variable correlates with fatalism (r=-.347, p<.05)) and egalitarianism (r=.295). However, none of the above cultural bias predicts catastrophic potential. In the case of Santiago Comaltepec, correlation is found for fatalist bias (r=-.528, p>.01), but it does not predict catastrophic potential as in Consejos Comunitarios.

There is relation between egalitarianism and the perceived catastrophic potential of climate change when the data bases are clustered together. In Consejos Comunitarios and Santiago Comaltepec, when the perceived catastrophic potential of dimate change is higher, the fatalism is lower. In Consejos Comuntiarios when the perceived catastrophic potential of climate change is higher the egalitarianism is too.

❖ Harm to future generations

Correlations between harm to future generations and cultural theory scales shows no significance at p<.05 as the value of correlation is constant for participants (for both Consejos Comunitarios and Santiago Comaltepec).

All participants considered that climate change will cause harm to future generations.

❖ Lack of knowledge to those exposed

Lack of knowledge to those exposed is not significantly correlated with any of the scales at p<.05 when databases are clustered together, neither it is for Consejos Comunitarios. However, in Santiago Comaltepec, fatalism correlate with it (=.437) but does not predict significantly predict it.

In Santiago Comaltepec there is a positive relation between the fatalism and the lack of knowledge to those exposed. Meaning that higher level of fatalism correspond to higher lack of knowledge.

- Lack of knowledge to scientists

The distribution of scores for each cultural bias in Santiago Comaltepec and Consejos Comunitarios and grouping databases together is the same for those agreeing and disagreeing with the idea that "there is no disagreement among scientists about consequences of climate change". Neither in Consejos Comunitarios nor for clustering databases scores on cultural theory scale neither differ significantly on participants thinking that "there is disagreement among scientists about causes of climate change" or those who do not think so.

In Santiago Comalptec the distribution of score is different in fatalism (Mdn=1.46), U=38.00, $p<.05$, z=-2.36 having a medium size effect of r=-.43.

People score higher in fatalism when disagreeing with the idea in Santiago Comaltepec.

Neither for Consejos Comunitarios nor for grouping databases are the scores on the four cultural theory scales significantly different between those disagreeing with the idea that "the majority of scientists think that climate change is not happening" and those who do not. In Santiago Comaltepec, the analysis was not computed they all agree with the responses.

According to the perceived lack of knowledge to scientists no differences in distribution of scores for each cultural bias were found. Only fatalist in Santiago Comaltepec score higher when disagreeing with the idea that "scientists disagree about causes of climate change".

6.2 Identifying the influence of environmental attitudes on perceiving climate change

Here environmental attitudes (Q11) and climate change related features are gauged. The items designed and translated to measure environmental attitudes are shown in Methodology chapter. The concepts "environmental" and "ecological" are used interchangeably in this section to refer to environmental attitudes.

6.2.1 Reliability and Validity analysis for NEP items

Reliability of the scale was tested with Cronbach's alpha and as suggested by Dunlap et al. (2000). PCA was performed to check the dimensionality of the scale. Output of the statistical analysis can be checked in Figure 1 in Appendix 5 and Table 1 to Table 6 in Appendix 5.

The analysis of the Mexican data indicated that the internal structure and consistency of the NEP scale was respectable. The value yields a Cronbach´s α of .731 for 14 items that would increase up to .785 if deleting item Q11.14 "Humans will eventually learn enough about how nature works to be able to control it". KMO test was not calculated as the correlation matrix was non-positive definite maybe due to the high number of missing values. The exploratory PCA showed a four factor solution with six items loading heavily on the first unrotated factor; this one accounting for 89 % of the total variance explained. Confirmatory PCA extracting one factor explained 24% of total variance.

The Colombian analysis was undertaken without one of the cases (participant 21 as there were no answers for any of the questions related to the scale). In Consejos Comunitarios the internal consistency for the 14 items in the Colombian case Cronbach´s α = .546, thus consistency of the scale was not enough. The removal of items with low correlation (item Q11.11 ("Plants and animals have as much right as humans to exist") changed Cronbach´s α of the scale only up to .599. Exploratory factor analysis suggested a five factors solution accounting for 71% of the total variance explained with six items loading onto the first factor. Confirmatory PCA with one factor explained only 24.08% of the total variance. KMO accounted for .328.

The solution was better when performing the analysis for both databases together because the number of cases was higher. Cronbach´s α yields a value of .788. This demonstrates that the scale was pretty reliable. Removing item Q11.11 ("Plants and animals have as much right as humans to exist") Cronbach´s α would increase to .799. Exploratory PCA

suggests a five factor solution, having a KMO=.554 and explaining 74.72% of the total variance. Unidimensionality (one factor solution) of the scale would only explain 29.18% of the total variance with seven items loading onto the first factor.

In the analysis of both databases together, the exploratory PCA shows a five component solution. Distribution of items into the different components did not correspond with items per each facet suggested by the theory. All of the items but one in the "Human domination about nature" load onto the first component together with one item of "Balance of Nature". The second component gathers three items but each of them from different facets. The third component is composed only by one single item corresponding to the facet of "Risk of an ecocrisis". The fourth component is composed by two items not belonging to the same face but related to potential harmful consequences of human intervention in nature. Two items of the "Limits to growth" facet constitute the fifth component.

In Consejos Comunitarios the first component gathers four items of the "Human domination" over nature facet. Two items load onto the second component differing in the facets but coinciding in the logic behind the statements that is humans can rule over nature. The third component groups three item from different facets but again the logic is shared to the fragility of nature. Two items load onto the fourth component, which indeed express contradictory ideas. Items reflect that human intervention in nature has negative effects but also that human will be able to control nature.

Results in Santiago Comaltepec show four components. The first one have five items from different facets: "Human domination over nature", "Balance of nature" and the "Risk of an ecocrisis". The same pattern of distribution is seen in the second component. The third one groups items of "Limits to growth" and items of "Human domination over nature".

To continue on the study of how items in the NEP scale grouped together a hierarchical cluster was performed (Figure 1 Appendix 5). Results were similar to those obtained in the exploratory PCA: the distribution of items of the scale does not align with none of the facets and not to the paradigm indicator proposed by the NEP theory. In Santiago Comaltepec, the solution shows one cluster gathering all the items except the item Q11.13 "The earth is like a spaceship with very limited room and resources". In Consejos Comunitarios the results show two clusters where items from different facts and representing both the DSP and the NEP paradigm were mixed. The same distribution of items was obtained when databases were grouped. Table 6-11 shows the distribution of

items of the NEP scale after the hierarchical cluster analysis. As seen in the table below the only items of the "Human exemptionalism" are clustered together (Table 6-11)

The different distribution of items in the PCA and hierarchical cluster analysis demonstrate that items of the scale may be gathered by any different logic apart from that established by the theory.

Table 6-11 Hierarchical cluster analysis: Distribution of NEP items (Grouped databases)

	Paradigm Indicator	Facets	Statement	Item on questionnaire
Cluster 1	NEP	*The risk of an ecocrisis*	If things continue on their present course, we will soon experience a major ecological catastrophe	6
	NEP	*Human domination over nature*	Plants and animals have as much right as humans to exist	11
	DSP	*Balance of nature*	The balance of nature is strong enough to cope with the impacts of modern industrial nations	4
	NEP	*Balance of nature*	The balance of nature is very delicate and easily upset	7
	DSP	*Limits to growth*	Humans will eventually learn enough about how nature works to be able to control it	14
	NEP	*Balance of nature*	When humans interfere with nature it often produces disastrous consequences	2
	NEP	*The risk of an ecocrisis*	Humans are severely abusing the environment	3
Cluster 2	DSP	*Human exemptionalism*	Human ingenuity will insure that we do not make the earth unlivable	9
	NEP	*Human exemptionalism*	Despite our special abilities humans are still subject to the laws of nature	12
	DSP	*Human exemptionalism*	The Earth has plenty of natural resources if we just learn how to develop them	10
	DSP	*Human domination over nature*	Humans have the right to modify the natural environment to suit their needs	1
	NEP	*Limits to growth*	We are approaching the limit of the number of people the earth can support	8
	NEP	*Limits to growth*	The earth is like a spaceship with very limited room and resources	13
	DSP	*Human domination over nature*	Humans were meant to rule over the rest of nature	5

6.2.2 Finding on statements of New Ecological Paradigm scale

Results of people scoring on the NEP scale are presented here. The results are presented by case study and by clustering both databases together (Table 6-12). The higher the mean, the higher the pro-environmental attitude is.

In Santiago Comaltepec, the highest score (3.86) is seen in the item Q11.11 "Plants and animals have as much right as humans to exist", while the lowest score (2.41) is found in item Q11.13 "The Earth is like a spaceship with very limited room and resources". In any

case, for any of the items of the scale the mean score is lower than 3. In Consejos Comunitarios the highest score was for item Q11.4 (3.46) "The balance of nature is strong enough to cope with the impacts of modern industrial nations", and the lowest score (1.89). for the item Q11.9 "Human ingenuity will insure that we do not make the earth unlivable. Unlike Santiago Comaltepec scores in Consejos Comunitarios fluctuate between 1.89 and 3.44.

As expected, people in both case studies mostly disagree with items from the DSP edge of the scale (Table 6-12). In general, the level of disagreement was greater for Santiago Comaltepec than for Consejos Comunitarios. In both case studies, similar patterns of disagreement answers are found in item Q11.4 "The balance of nature is strong enough to cope with the impacts of modern industrial nations".

In Consejos Comunitarios higher level of agreement for the DSP is in the item Q11.9 in the scale "Human ingenuity will insure that we do not make the earth unlivable", 25% of people agree with that idea. Higher level of disagrement is seen in item Q11.4 "The balance of nature is strong enough to cope with the impacts of modern industrial nations"

In Santiago Comaltepec higher levels of disagreement in the DSP side of the scale are seen in the item Q11.10 "The Earth has plenty of natural resources if we just learn how to develop them". The highest percentage of agreement is seen in item Q11.9 "Human ingenuity will ensure that we do not make the earth unliveable" as in Consejos Comunitarios.

On the average, the NEP side of the scale shows higher levels of agreement than disagreement. In Consejos Comunitarios participants strongly agree with the idea that "Plants and animals have as much right as humans to exist" (item Q11.11). While low percentage of strongly agreement is found in item Q11.8 "We are approaching the limit of the number of people the earth can support", only 5% of people strongly agree with it and 22.5% agree. In Santiago Comaltepec stronger levels of agreement coincide with the same item as people in Consejos Comunitarios (item Q11.11). The item with lower level of strongly agreement is item Q11.13 " The earth is like a spaceship with very limited room and resources". This is due to the greater percentage of DK/ NA responses. Overlooking this situation, the item Q11.2 "When humans interfere with nature it often produces disastrous consequences" presents the lower percetange of strongly agreement (20% of respondents).

Regarding the number of DK/ NA responses People in Santiago Comaltepec present a higher percentage of DK/ NA in the item Q11.13 "The earth is like a spaceship with very

limited room and resources" accounting for 60% of responses. In the Colombian case study DK/NA responses were concentrated on item 11.8, around 17.5% of responses "We are approaching the number of people the earth can support".

Table 6-12 Distribution of responses of the NEP scales

PARADIGM	STATEMENT		SCALE					MEAN
			1 (STRONGLY DISAGREE)	2 (MILDLY AGREE)	3 (AGREE)	4 (STRONGLY AGREE)	DK/ NA	
DSP	Humans have the right to modify the natural environment to suit their needs	Santiago Comaltepec	27%	70%	0%	0%	3%	3.27
		Consejos Comunitarios	32.50%	25%	37.50%	2.5%	2.50%	2.89
		Total						3.06
DSP	The balance of nature is strong enough to cope with the impacts of modern industrial nations	Santiago Comaltepec	77%	13%	3%	0%	7%	3.7
		Consejos Comunitarios	62.5%	17.5%	17.5%	0%	2.50	3.46
		Total						3.60
DSP	Humans were meant to rule over the rest of nature	Santiago Comaltepec	77%	23%	0%	0%	0%	3.767
		Consejos Comunitarios	17.5%	10%	47.5%	15%	10.00	2.33
		Total						2.95
DSP	Human ingenuity will ensure that we do NOT make the earth unliveable	Santiago Comaltepec	23%	53%	20%	0%	3%	3.03
		Consejos Comunitarios	5%	5%	60%	25%	5%	1.89
		Total						2.40
DSP	The Earth has plenty of natural resources if we just learn how to develop them	Santiago Comaltepec	83%	10%	7%	0%	0%	3.76
		Consejos Comunitarios	20%	20%	40%	17.5%	2.5%	2.43
		Total						3.01
DSP	Humans will eventually learn about how nature work and will be able to control it	Santiago Comaltepec	50%	13%	0%	0%	37%	3.79
		Consejos Comunitarios	37.5%	32.5%	15%	7.5%	7.5%	3.081
		Total						3.39
NEP	When humans interfere with nature it often produces disastrous consequences	Santiago Comaltepec	0%	3%	53%	43%	0%	3.40
		Consejos Comunitarios	7.5%	5%	65%	20%	2.5%	3.00
		Total						3.17
NEP	Humans are severely abusing the environment	Santiago Comaltepec	0%	0%	60%	40%	0%	3.40
		Consejos Comunitarios	10%	5%	55%	27.5%	2.5%	3.02
		Total						3.18

PARADIGM	STATEMENT		SCALE					MEAN
NEP	If things continue their present course. we will soon experience a major ecological catastrophe	Santiago Comaltepec	3%	0%	47%	50%	0%	3.43
		Consejos Comunitarios	7.5%	5%	40%	42.5%	5%	3.23
		Total						3.32
NEP	The balance of nature is very delicate and easily upset	Santiago Comaltepec	0%	3%	27%	67%	3%	3.65
		Consejos Comunitarios	0%	12.5%	47.5%	37.5%	2.5%	3.25
		Total						3.43
NEP	We are approaching the limit of the number of people the earth can support	Santiago Comaltepec	0%	10%	50%	23%	17%	3.16
		Consejos Comunitarios	32.5%	22.5%	22.5%	5%	17.5%	2.00
		Total						2.50
NEP	Plants and animals have as much right as humans to exist	Santiago Comaltepec	0%	0%	13%	87%	0%	3.86
		Consejos Comunitarios	0%	2.5%	47.5%	45%	5%	3.44
		Total						3.63
NEP	Despite our special abilities, humans are still subject to the laws of nature	Santiago Comaltepec	10%	10%	43%	37%	0%	3.06
		Consejos Comunitarios	25%	20%	42.5%	7.5%	5%	2.34
		Total						2.65
NEP	The earth is like a spaceship with very limited room and resources	Santiago Comaltepec	3%	17%	20%	0%	60%	2.41
		Consejos Comunitarios	42.5%	15%	27.55	5%	10.00	1.94
		Total						2.15

6.2.3 Exploring environmental attitudes

Two procedures were used to calculate the data and validate results. The small number of participants allows us to explore data at the individual level and also to discover the subtleties of environmental attitudes within the communities. As in the case of cultural theory and in light of the results, final decision was to perform analysis with NEP scale with an index created by mean scores.

- Simple score mean

The score was summed to obtain the maximum score for the participants for every item (Table 7 in Appendix 5). Following the mean criteria, people were categorised by having or not a pro-environmental attitude. Under this procedure, participants whose answer ranges between 1 and 2 would not have a pro-environmental attitude whereas those whose

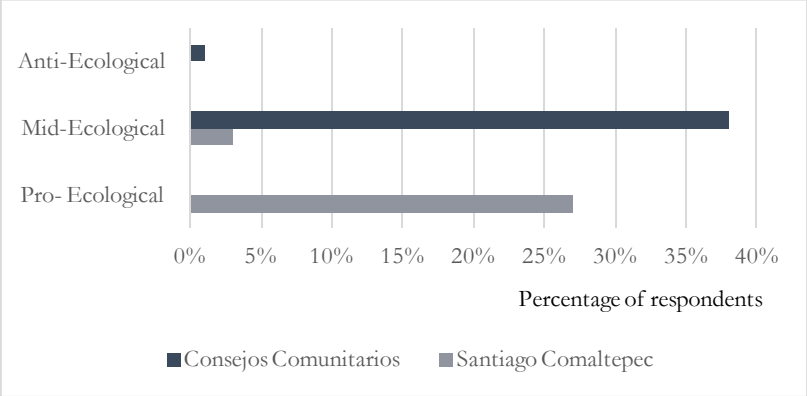
answers were rated between 3 and 4 would be categorised as having a pro-environmental position. Based on the mean score and from the total of respondents (n=69) 36 endorse a pro-environmental attitude (25 are participants from Santiago Comaltepec) while 33 have a non-pro-environmental attitude (96.6% are from Consejos Comunitarios). Using this criterion gives little information because individuals who are in the limit to 3 are labelled as No pro-environmental. When the limit was set in 2.5 the percentage of people labelled as pro-environmental was 91.03%.

- Labelling people's environmental attitudes

Summing the 14 items value, with potential values 14-56, neutrality was marked at 28, and higher values represent a greater endorsement of an environmental worldview. When summing full score, the results show that all participants would be having a pro-environmental attitude. The total mean is 42.44; people from Consejos Comuntiarios scored 38.55, and people from Santiago Comaltepec 47.81. In both case studies, participants have a relatively high environmental concern.

Once this calculation was done, for the purpose of being, more specific scores were allocated into three categories (pro-ecological, mid-ecological, anti-ecological). Only the Mexican individuals (27) are categorized as having a pro-ecological attitude. Most of the participants are classified as having a mid-ecological attitude, 38 Colombian and three from Mexico. One single individual from Consejos Comunitarios is classified as anti-ecological. However, being the score 30.16, the participant is in the limit to be considered mid-ecological. Figure 6-8 **The participants environmental attitudes** in percentage of respondents categorized in each of the three categories. According to this 97% of participants from Consejos Comunitarios, are classified as mid-ecological and the 3% as anti-ecological. Mexican participants show a very different pattern: there are no anti-ecological participants, 3 of participants in Santiago Comaltepec are classified as mid ecological and the 27 participants would be regarded as having a pro-ecological attitude.

Figure 6-8 The participants environmental attitudes



6.2.4 Environmental attitudes and climate change

6.2.4.1 Environmental attitudes and sociodemographic factors

Results from ANOVA and *t*-test demonstrate that country, educational level, ideology and gender have an effect in scoring in NEP (Q1, Q2, Q3, and Q36). Subsequent ANOVA and *t*-test analysis was not performed for Santiago Comaltepec and Consejos Comuntiarios separately, as results already differs in terms of country (Miller and Chapman 2001). Output of the statistical analysis can be seen in Table 8 to Table 12 Appendix 5.

- Country

On average Mexican participants score higher in NEP (M=3.41, SD=.23) than Colombians (M=2.74, SD=.26). This difference is significant $t(67)=-10.832$, representing a large effect r=.797.

Participants from Santiago Comaltepec have a more environmental attitude than people from Consejos Comunitarios.

- Age

The effect of age categories is not significant at $p<.05$ $F(2,66)=1.073$. Young people, middle-aged and elderly did not significantly differ in scoring NEP.

Age was not a factor influencing on having a more or less environmental attitude.

❖ Education level

The effect of educational level is significant on having high scores on NEP at $p<.05$ $F(2,65)=7.343$ $\omega= .39$. At the same degree of significance, post hoc analysis using Tukey's HSD indicated that scores are higher for people with higher education (M=3.28, SD=.32) than for the middle level (M=2.86, SD=.41). Scores in NEP scale do not significantly differ between participants with primary education (M=3.09, SD=.38) and people with higher and medium education.

Participants with higher education have a more environmental attitude than people with secondary education.

❖ Ideology

Significant and large effect is found for the impact of ideology in scoring in NEP $F(3,32)=5.707$, $p<.05$ $\omega=.52$. Post hoc analysis using Tukey's HSD at $p<.05$ indicated that NEP score are higher in centre-left (M=3.41, SD=.29) and left-leaning individuals (M= 3.34, SD=.32) than for right-leaning participants (M=2.84, SD= .36). No differences are found in scores in centre-right individuals.

Left and centre-left participants have a more environmental attitude than right or centre-right individuals.

❖ Gender

On average women (M= 3.17, SD=.42) have higher scores than men (M= 2.92, SD= .38) in NEP scale. So, women endorse a more pro-environmental attitude than men. This difference is significant at $p<.05$ $t(67) = -2.508$, having a medium effect r=.29.

Women have a more pro-environmental attitude than men.

6.2.4.2 Climate change occurrence and origin, importance to climate change, and concern about depletion of natural resources and environmental attitudes

The results of source of origin and occurrence of the occurrence of climate change (Q22), the importance of depletion of natural resources (Q10) and the importance of climate change (Q21) in terms of environmental attitude are measured.

❖ Origin and occurence of climate change

A descriptive analysis was performed for classifying individuals based on their environmental attitude. For having an environmental attitude the respondent should have a mean score equal or higher than 3. Out of the sample (n=69) the descriptive analysis shows that 23% of the respondents considered that climate change is caused exclusively by human actions, and 9% believe that climate change is originated by both human actions and natural origin.

Subsequent Homogenity Chi Square analysis for each of the possible sources of origin of climate change was performed based on the categories anti-ecological, ecological or pro-ecological (Table 13 to Table 19 in Appendix 5).

Climate change is due to human actions

Further exam on attributions of origin and occurrence of climate change illustrate that from the total of respondents being pro-ecological (27), 21 considered that climate change is caused exclusively by human actions.

Homogeneity Chi-square shows significant association neither in Santiago Comaltepec nor in Consejos Comunitarios. In the case of clustered databases the analysis shows association X^2 (1)=3.351 at $p < .05$, but with no significant effect. Out of the mid-ecological respondents (40), 60% (23 respondents) believe that climate change is caused by human actions. This association is significant neither for Santiago Comaltepec, Consejos Comunitarios nor for grouping data bases. The anti-ecological respondents do not attribute climate change to human actions.

Climate change is due to natural changes

The second source of origin of climate change is the natural changes in the climate system. Twenty five of the pro-ecological responses disagree with that idea. Homogeneity Chi-Square tests does not show relation with variables for Santiago Comaltepec, Consejos Comunitarios or grouping data bases. Mid-ecological responses disagree as well with the idea: only four of them agree. No significant association was found with the Homogeneity Chi-Square test in any of the three situations (Santiago Comaltepec, Consejos Comunitarios and clustering databases).

Climate change is due to natural changes and human actions

Addressing origin of climate change as cause of both human actions and natural changes, 30 of the pro-ecological respondents agree with the statement. According to Homogeneity Chi Square there is no association between having a pro-ecological attitude and agreeing or disagreeing with the statement in any of the three situations. Twelve mid-ecological respondents agree with the statement. The association is significant when assembling data bases $X^2(1)=3.563$ at $p<.05$; yet the effect of the association is not significant.

The anti-ecological respondent has no information to answer on the attributions of origin of climate change.

There is no particular relation between having a pro-environmental, mid-ecological or anti-ecological attitude and the origin and occurrence people attribute to climate chang

- Importance of climate change

The importance attributed to climate change was examined using the categorization of people in anti-ecological, mid ecological and pro ecological. Descriptive analysis show that out of those being pro-ecological (27 respondents) 26 think climate change is very important and 1 extremely important. Homogeneity Chi-Square shows that for mid-ecological participants the relation with importance attached to climate change is not significant in any of the case studies (Table 20 to Table 22 in Appendix 5). Descriptive analysis shows that from the total mid ecological respondents (41), one consider climate change to be not important at all, 11 somewhat important, 23 very important and six extremely important. The remaining anti-ecological respondent considers climate change somewhat important. Homogeneity Chi-Square shows that there is no significant relation between being pro-ecological and the importance attached to climate neither for Santiago Comaltepec nor for Consejos Comunitarios. This relation exists when the cases are clustered together $X^2(3) =14.164$ $p< .05$, Cramers $V=.433$, shows a medium effect at $p<.05$.

When databases are clustered together, there is a relation between being pro-ecological and giving importance to climate change.

Following, importance of climate change was tested with the created NEP index with the mean scores of people (Table 23 to Table 26 in Appendix 4). Neither for Consejos Comunitarios nor for Santiago Comaltepec, environmental attitudes is correlated for

importance attached to climate change at $p<.05$. If the data bases are clustered together importance of climate change is significantly correlated with environmental attitude index at $p<.05$, $r=.29$. Simple regression analysis was used to test if environmental attitude predicted importance to climate change.

The results of the regression indicated that the environmental attitude predicts 9.4% of the total variance $R^2=.094$, $F(1,67)=6.929$; environmental attitudes significantly predicted importance to climate change ($\beta=.306$, $p<.05$).

When data bases are grouped together, environmental attitudes are related to importance of climate change. The higher the environmental attitude the higher the important climate change is.

- Depletion of natural resources

The environmental attitude was used to predict people's concern about depletion of natural resources (Q10) in participant's countries (Table 27 to Table 29 in Appendix 4). No significant correlation is found ($r=-.20$, *p=ns)*. Consequently, NEP index did not predict importance to depletion of natural resources

($\beta=-.139$, $p<.05$). Separate analysis for Santiago Comaltepec and Consejos Comunitarios does not show correlation between environmental attitudes and depletion at $p<.05$. The situation is the same when looking for correlation between environmental attitudes and concern about depletion of natural resources both in Consejos Comunitarios and Santiago Comaltepec at the same level of significance.

Having an environmental attitude is not related with the concern about depletion of natural resources in neither of the case studies.

6.2.4.3 Environmental attitudes and behaviour change

Behaviour and willingness to deal with climate change were analysed based on environmental attitudes. To have an environmental attitude the participant should score equal or higher than 3 on the NEP index. Considering this, 54% of participants answer they would be willing to change their behaviour to reduce their contribution to climate change (Q23). When the analysis is done based on the three categories of environmental attitudes, all pro-ecological respondents are willing to change their behaviour. The association based on Homogeneity Chi-Square, is not significant neither for Santiago Comaltepec, Consejos Comunitarios nor when grouping data bases. Thirty seven participants, out of the 41 mid-ecological participants, would be willing to change their

behaviour to reduce climate change. Results of the Homogeneity-Chi Square show no significant association in any of the three plausible cases. Surprisingly, the anti-ecological respondent would be as well willing to reduce his contribution to climate change.

In spite the relation not being statistically significant, pro-ecological, mid-ecological and anti-ecological participants in both case studies would be willing to change behaviour and reduce their contribution to dimate change

Behaviour change was addressed as well by asking preferences for either protecting the environment or having more jobs (Q17). The ANOVA analysis F (2,66)=5.721 ω=.34 shows that there are differences in scoring at NEP scale depending on the category chosen. The main effect of answering protecting the environment, having more jobs or that it would depend on the situation of the country is significant at $p<.05$. Mean scores are significantly different (higher) for those preferring a balance in both situations (M=3.17, SD=.39) than for those preferring to protect the environment (M=2.87, SD=.38).

ANOVA analysis shows that individuals in Consejos Comunitarios, do not show differences in having a more pro-environmental attitude depending on choosing protecting the environment, having more jobs, a balance between both or that it would depend on the situation F(1,36)=1.086, $p>.01$. In Santiago Comaltepec ANOVA shows that there were significant effect of the response in having an environmental attitude F(2,27)=5.98, ω=-.45. Tukey HSD post-hoc analysis shows that those who prefer to take care of the environment and those saying that it would depend on the situation, have similar means on the NEP scale. However, the mean for those preferring a balance between having a job and caring for the environment are higher (M=3.43,SD=.28) than for those who selected to protect the environment (M=2.87,SD=.56).

In Consejos Comunitarios no significant realtion was found between having an envionrmentla attitude and the type of response chosen. In Santiago Comaltepec people prefering a balance between having more jobs and protecting the environment have a more envirnomental attitude than those preferring to protect the environment.

6.2.4.4 Cultural bias predicting environmental attitudes

Variables addressing the Cultural Theory were used to predict environmental attitudes. A correlation matrix of all predictor's variables was scanned to test the multicollinearity assumption. It appears that when all four worldviews are related to the environmental attitude. The correlation coefficient for hierarchy, fatalism and individualism and the NEP

index was negative. The relations is positive for egalitarianism (Table 33 to Table 37 Appendix 4). That is to say the higher the value for NEP index the lower the value for hierarchy, fatalism and individualism indexes and the higher the value for egalitarianism.
Separate analysis for case studies, shows that in Consejos Comunitarios egalitarianism (r=-.489, p>.01) and fatalism (r=-.522, p<.01) significantly correlate with environmental attitudes. Regression analysis show that both fatalism and egalitarianism significantly predict environmental attitudes B=-.393, b=-.439, R2= .192. Fatalism b=-.466, B=-.177, R^2=.217.
In Santiago Comaltepec, significant correlation is found between fatalism and environmental attitude (r=-.370) p>.05, however, fatalism does not significantly predict environmental attitude.

When databases are clustered together all cultural bias are related to environmental attitudes. For higher values in egalitarianism the environmental attitude is higher. However, the opposite occur for the other three cultural biases. In Consejos Comunitarios fatalism and egalitarianism in associated with environmental attitude. The higher the environmental attitude the lower the value for fatalism and the higher the value for egalitarianism are. In Santiago Comaltepec the situation is the same as for fatalism, the higher the environmental attitude the lower the value for fatalism.

6.3 Psychological distances of climate change and temporal discounting

6.3.1 Social and geographical distance of climate change

The psychological distance of climate change was addressed in social, geographical and temporal terms (Q26, Q28). Results of the psychological distance dimensions can be seen on Appendix 6. For the whole sample in the study (n=70), climate change is not viewed as a geographical or a distant social phenomenon. When asking about how much climate change would affect aspects related to social and geographical distance, and natural elements in their closed, the percentage of people stating *a great deal* amounts for 83%. It is worth mention that 97% of respondents consider that plants and animals will be affected *a great deal*. Concerning social distance, respondents agree that climate change will affect both people in industrialized (83% of respondents) and non-industrialized countries (86% of respondents). Respondents equally perceive the effect of climate change as serious for

them as for distant people and places. They perceive environmental degradation to be equally serious. The Figure 6-9 shows number of respondents' agreement with each statement at local and global scale.

Figure 6-9 Perceived geographical and social distance (Consejos Comunitarios)

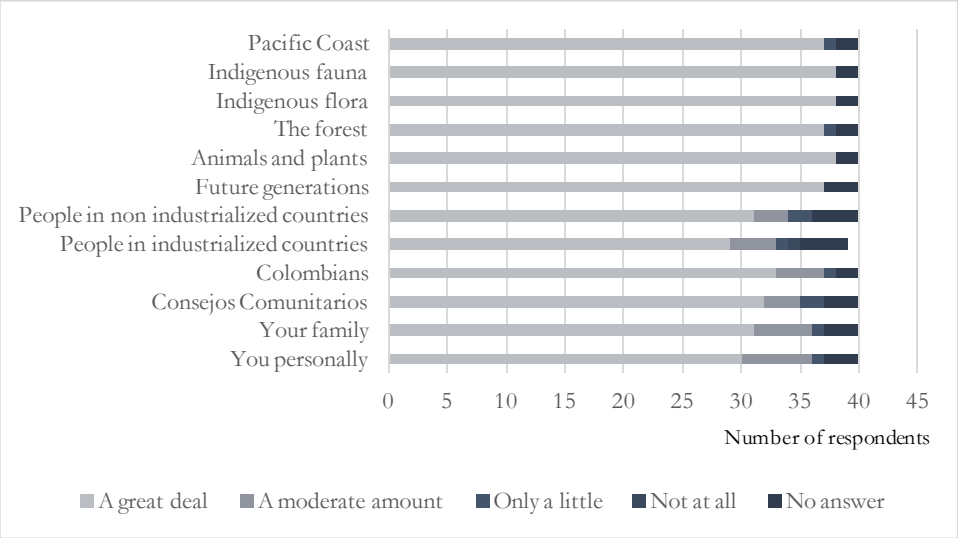
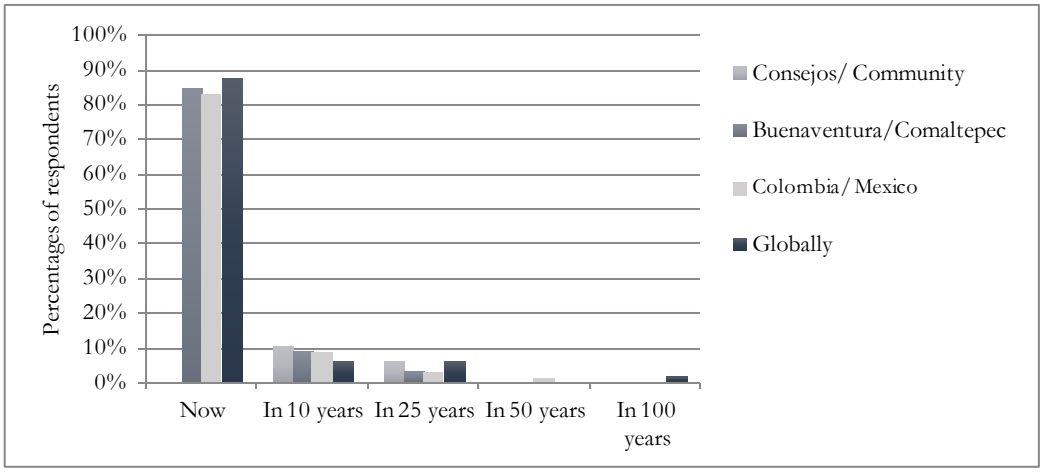


Figure 6-10 Perceived social and geographical distance (Santiago Comaltepec)

Respondents indicated that they felt the effects of climate change to be temporally close. Eighty percent of total respondents believe that both Mexico and Colombia are currently feeling the effects of climate change. There is total agreement among Mexican respondents with the idea that climate change affecting their local area, their country and globally (Figure 6-11). In the case of Colombia, 26 participants considered that climate change is currently affecting their community, 7 considered that it will be affected in 10 years, and 4

in 25 years. When referring to Colombia, 28 participants think that it is already being felt, sin that it will be in 10 years, one in 50 and 1 in 100 years. When asking about when climate change will affect globally, responses are pretty similar, 31 participants believe that climate change is currently impacting at a global scale; four respondents believe that it will be felt in 10 years and four in 25 years. Figure 6-11 below shows results in percentage for both Santiago Comaltepec and Consejos Comunitarios. Additionally for the latter case, Figure 6-11 show in percentage of participants agreement with each potential response of the perceived temporal distance of climate change.

Figure 6-11 Perceived temporal distance of climate change for Santiago Comaltepec and Consejos Comunitarios



6.3.1.1 Psychological distance of climate change and importance to climate change

For the purpose of seeing how items of psychological dimensions of climate change related to each other, correlation analysis between items was performed. Items reflecting aspects of local nature do not correlate with item of perceived temporal distance. People perception on impacts on every item but indigenous flora and fauna have large effect size in all relationship. The correlation between aspects of psychological distance were all positive except for autochthonous flora that negatively correlate with an aspect of geographical distance (Survey Table 1 Appendix 8), it can be observed that dimensions on social distance strongly correlate with each other at $p<.01$. Small effects arenoted in the correlation between impacts on fauna and flora of the area and social distance dimensions.

Factor analysis was carried out on variables except for animals and plants, the forest, autochthonous flora and fauna. Exploratory PCA on social and geographical psychological dimensions, show two components where item "people in richer countries" and

"Colombian and Mexican" loaded into the second component, KMO=.645 shows good result. Because the correlation between components of the psychological distance scale were high, (r=.633) items were combined into a single scale to measure "social and geographical distance of climate change". The scale was reliable being Cronbach's α=.906, this value increasing up if deleting item "Costa Pacifica/ Sierra de Oaxaca" to Cronbach's α =.921. Because the difference was not so significant items was kept on the scale.

Perceived social and geographical distance index and importance to climate change were inspected using correlation analysis. It shows that correlation is significant at p<.05, r=-.255. To check on the directionality of the relation, regression analysis was performed too. Results show that the index predicted importance to climate change R^2= .075, F(1,67)=5.42 significant at p<.05. (β= -.280, p<.05), this meaning that the higher the importance of climate change the closer the perceived social and geographical distance of climate change to respondents. Examining on the relation between concern about depletion of natural resources and psychological distance did not show any significance at p<.05.

Psychological distance dimensions were analysed as related to catastrophic potential of climate change. Results show that there is significant relation between the perceive closeness of climate change and the catastrophic potential of the issue (r=-,242, p<.05). The closer is perceived the more harmful is expected to be climate change

For participants the more important and the more catastrophic climate change is, the closer they feel it. No relation was found between the closeness of climate change and the degree of concern about depletion of natural resources.

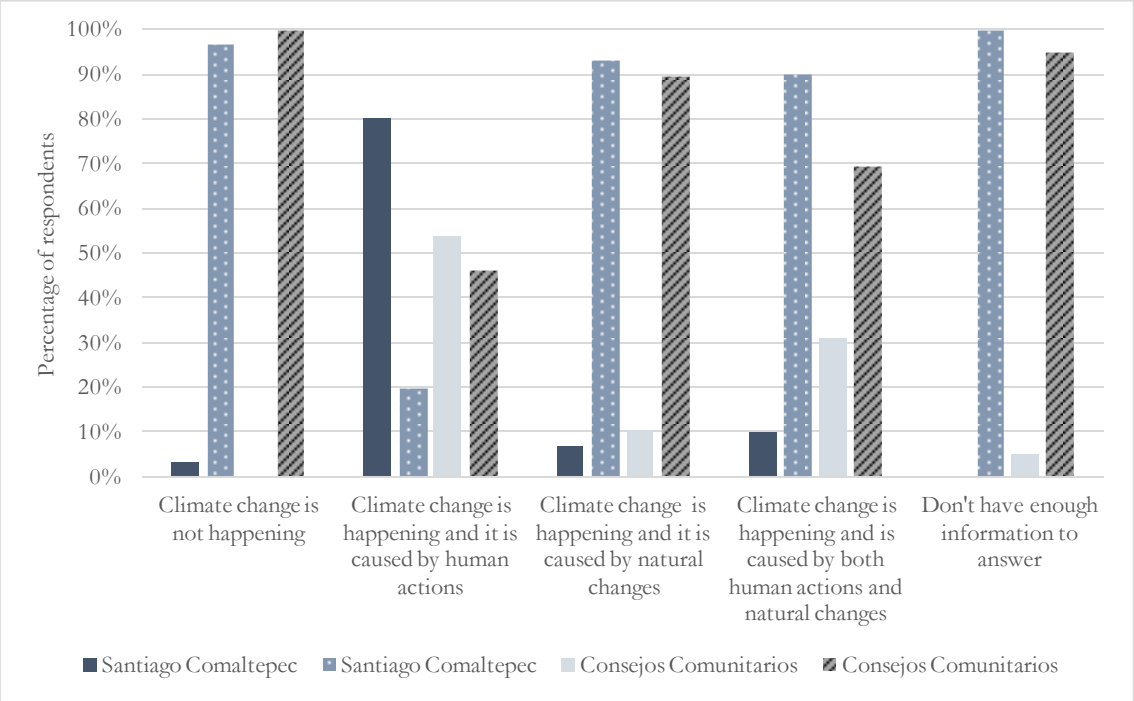
6.4 Scepticism and uncertainty about climate change

Issues about information of climate change, uncertainty and scepticism (Q22, Q29, Q30, and Q34) are shown is this section and results of the analysis can be checked on Appendix 7. Previous results on psychological distances showed that respondents acknowledge that climate change is currently posing a threat to themselves, their family, community and country, and the natural elements in their surroundings.

Descriptive analysis (n=70) shows the percentage of participans and level of agreement with sources of origin of climate change. In Santiago Comaltepec, 80% of respondents agree with the idea that climate change is happening and is caused by human actions, the percentage in Consejos Comunitarios is 54%. When attributing the cause of climate change

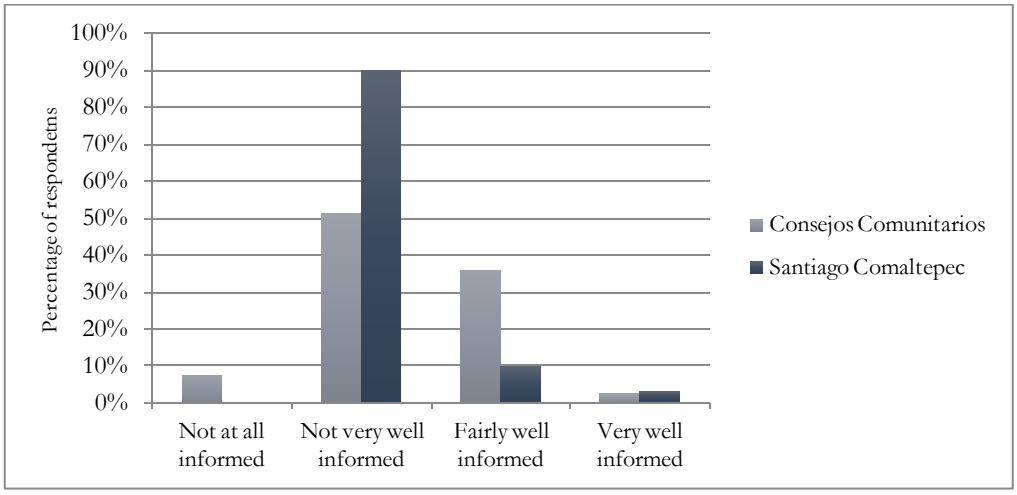
to natural changes in the system, the percentage of participants agreeing in Santiago Comaltepec is 7% while in Consejos Comunitarios is 10%. Attribution to both natural causes and human actions acounts for 10% of respondents in Santiago Comaltepec and 5% in Consejos Comunitarios. Here, the percentage of not having enough information to answer that question was of 5% (Figure 6-12).

Figure 6-12 Occurrence and origin of climate change



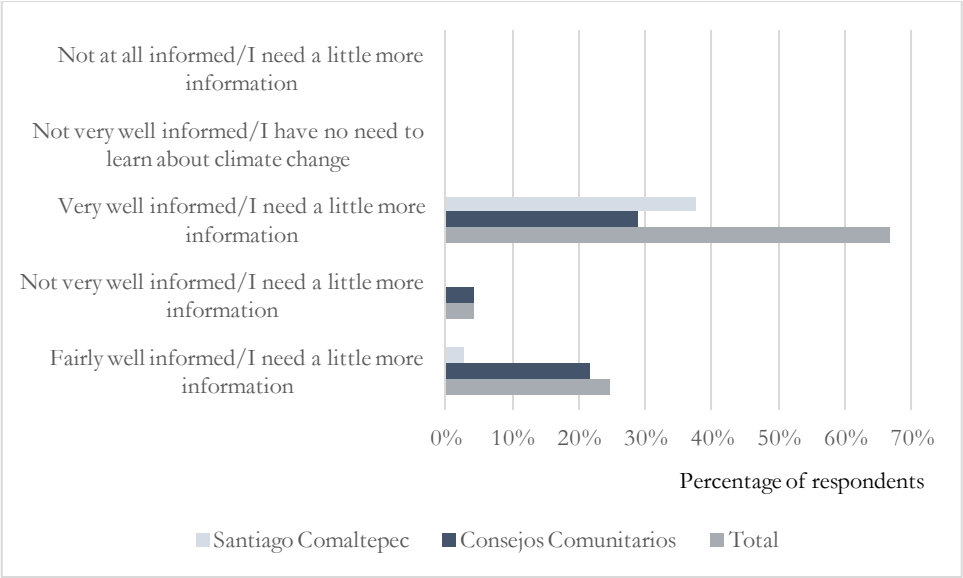
Descriptive analysis of the self-reported level of information demonstrate that 8% of respondents from Consejos Comunitarios are not at all informed about climate change. People in Consejos Comunitarios and Santiago Comaltepec 51% of respondents and 90% respectively are not very well informed about climate change. Results show that 36% of respondents from Consejos Comunitarios and 10% in Santiago Comaltepec are fairly well informed. Results can be seen in Figure 6-13 6-13 that shows the percentage of respondents according to their level of information.

Figure 6-13 Level of information about climate change



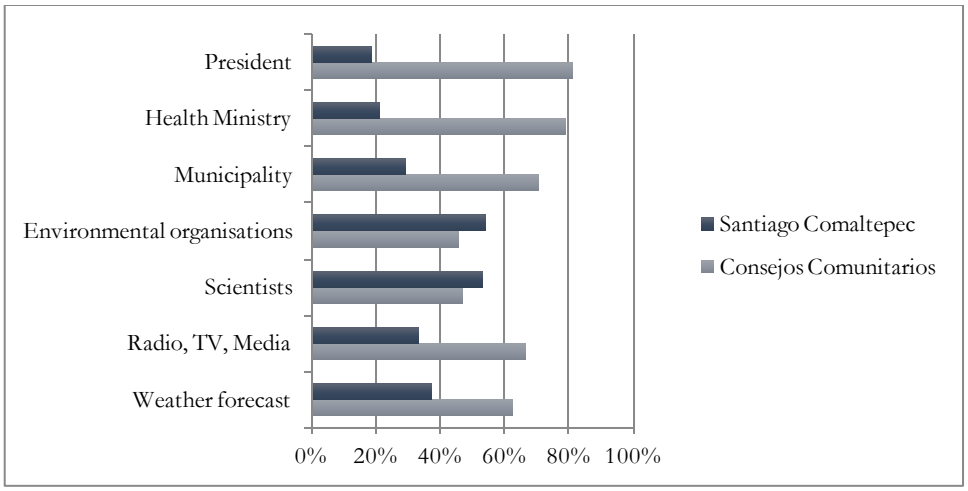
To better analyse the level of information and the need of receiving more information, the analysis was performed for each of the categories of the self-reported level of information. Sixty-seven percent of respondents are considered to be not very well informed but will be needing more information about climate change (29% being from Consejos Comunitarios and 38% from Santiago Comaltepec). Even fairly well-informed participants still they will need more information about climate change, most of them from Consejos Comunitarios (22%) (Figure 6-14).

Figure 6-14 Level of information and need to receive more information



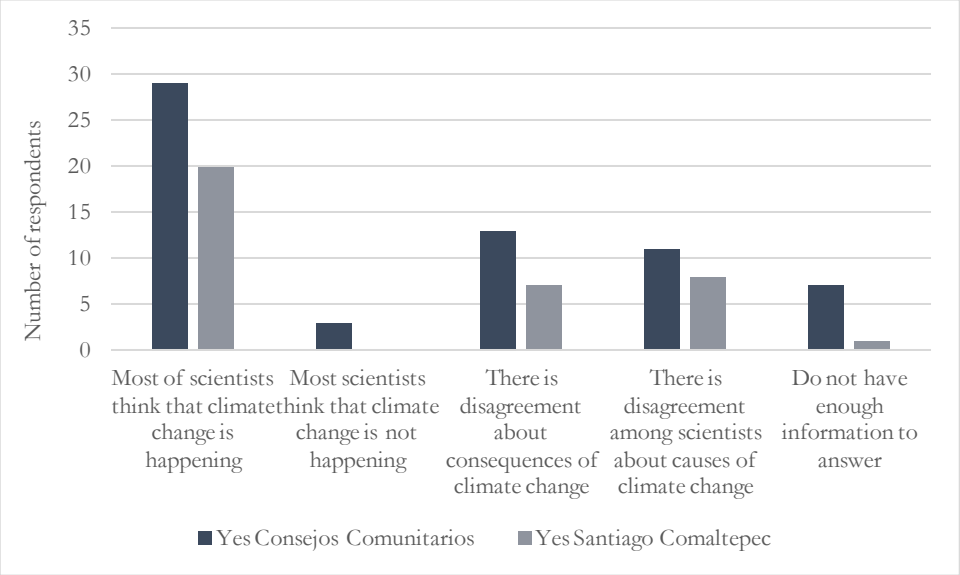
Further analysis on scepticism was done to examine whether people in the communities are sceptical by exploring confidence in sources of information (Figure 6-15). To facilitate the descriptive analysis the different categories measuring confidence in sources of information strongly distrust, somewhat distrust, somewhat trust, and strongly trust were merged to give rise two categories resulting in: distrust and trust sources of information. Based on this, higher levels of trust for respondents in Santiago Comaltepec are place on scientists and environmental organisations, 53% and 54% respectively. In the case of Consejos Comunitarios the President along with the Health Ministry are seen as the most trustee sources of information, 81% and 79% of respondents trusting respectively.

Figure 6-15 Confidence in sources of information



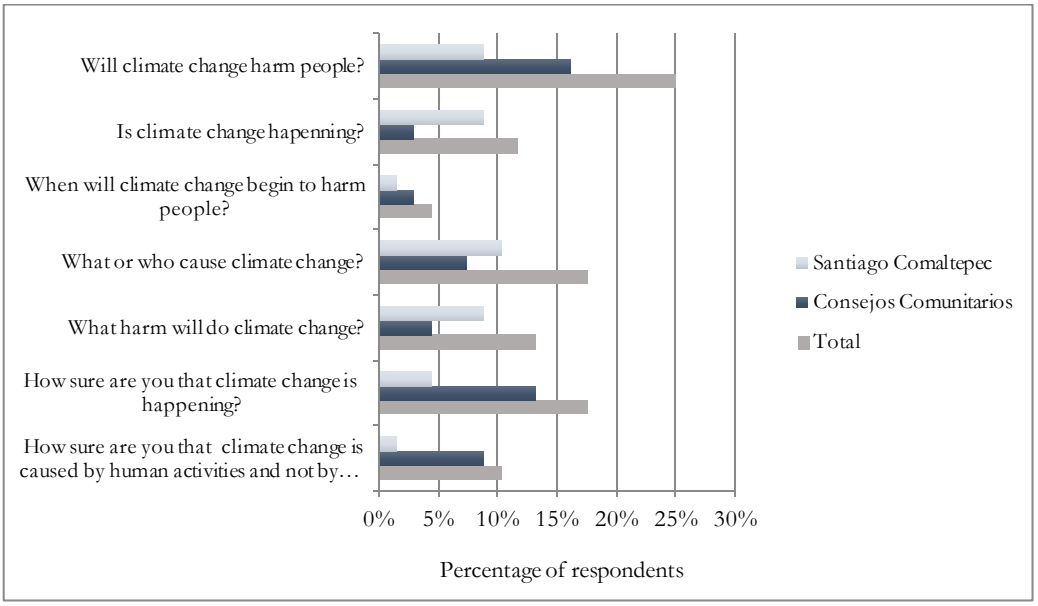
The perceived agreement and disagreement among scientists was also measured (Figure 6-16). As seen from the results 49 respondents most of the scientists think that climate change is happening. Perceived disagreement among scientists is not too high, twenty respondents think that there is disagreement about consequences, and 19 respondents do it about causes of climate change.

Figure 6-16 Perceived agreement and disagreement among scientists



Considering that respondents could opt only for one of the suggested questions, Figure 6-17 shows the percentage of respondents for each question. Twenty-five percent of people will be interested to know whether climate change will harm people and 18% of respondents would be interested in knowing how sure scientists are that climate change is happening. Per case study, respondents in Consejos Comunitarios are keen on asking whether climate change will harm people (about 16% of responses). Responses in Santiago Comaltepec are equally distributed among what harm will cause climate change, who or what is causing climate change and whether climate change will harm people. Equal percentage of interested is placed in the question about climate change is occurring.

Figure 6-17 Preferred question to ask about climate change



Following, associations between country and preferences for questions to ask to a scientist is presented. Using Fisher's exact test the analyses were performed for the question with higher number of replies: when climate change will start harming people, who and what is causing climate change, and what harm will climate change cause.

The first question refers to when climate change will start harming people. No significant association between country and choosing that question to a scientist (p=.574, FET). Same results were found for willing to know who and what is causing climate change (p=.204; FET) and what harm will climate change cause (p=.344; FET), no association were found between country and having chosen previous questions.

6.5 Behaviour change and climate change

Here, outcomes on behaviour change in relation to climate change and the environment are presented (Q14, Q15, Q17, and Q23). Output for the statistical analysis can be seen in Appendix 8. The first question is about people thinking of nature when buying things. Descriptive statistics analyses show that 72% of the respondents think about the impact on the nature when buying products. When respondents are from Colombia 53.8% of respondents think on the environment while in Santiago Comaltepec 100% do it. The same question was explored considering sociodemographic factors (Table 1 to Table 2 in Appendix 8). Homogeneity Chi-Square demonstrate that the variable country is associated with thinking about the environment when buying products $X^2(1)=18.73$, with a medium large effect as Cramer's V= .521. No significant relation is found neither with educational

level, ideology nor gender. In Consejos Comunitarios there is significant association of age $X^2(2)$ =7.247 and thinking on the impact on nature when buying products; this association has a medium effect Cramer's V =.431 and it is significant. Seventy percent of young think on the environment, 73.3% do it when the respondent is middle aged and 71,4% among the elder people do it. In Santiago Comaltepec no relation between neither of the four of the sociodemographic factors is found.

Country seems to influence the responses of participants when saying if they think about nature when buying products. All respondents from Santiago Comaltepec think about nature when buying products whereas in Consejos Comunitarios this account for half of the population. In Consejos Comunitarios people think on the environment regardless their age category.

Behaviours were also elicited by asking whether respondents think authorities help them to behave sustainably (Table 3 to Table 4 in Appendix 4). The descriptive analysis illustrated that frequencies are distributed in a very similar fashion: 40% of the respondents believe that authorities help them to behave sustainable, whereas 44% are at odds. Results on the Homogeneity Chi-Square shows that in Consejos Comunitarios association is found significant with gender $X^2(1)$=5.781 and the relation has a medium effect being Cramer's V= .412. When the respondents is a male 57,1% of them think that the authorities help them, while only 15.4% of females agree with it.
In Santiago Comaltepec significant association is found with age $X^2(2)$=7.257 with a medium/large effect Cramer's V=.528. When the respondents is young 88.9% think that authorities help them to behave sustainable, 30% when the individual is middle –aged and 50% when the respondent is elder.

In Consejos Comunitarios men tend to think the authorities help them to behave sustainably more than women. In Santiago Comaltepec young people tend to think that the authorities help them more than any other age category

Participants were asked as well about their preference for either protecting nature or having more jobs (Table 8 Appendix 8). The descriptive analysis shows that 51% of participants consider that protecting the environment is more important, 41% state that having more jobs, and 7% that it would depend on the situation of the country.

The Homogeneity Chi Square test demonstrates that country is found to be a factor associated with preferences for protecting the environment or fostering the economy, $X^2(2)=16.955$, Cramer's V=.492, a relation of medium effect. When the participant is from Santiago Comaltepec, 63% choose a balance between having more jobs and protecting the environment, while if the participant is from Consejos Comunitarios 72.5% would say protecting the environment.

In Santiago Comaltepec there is association between the educational level and the choice made $X^2(4)=5.610$; the effect of this association was however not significant. From the total of respondents 33.3% with primary education, 42.9% awarding secondary education and 7.1% awarding higher education would say that is better to protect the environment. Neither for gender nor ideology, nor age significant association is found for each case study separately.

Country seems to influence responses of participants; people from Consejos Comunitarios are more inclined to protect the environment and those from Santiago Comaltepec preferring a balance between having more jobs and protecting the environment. In Santigo Comaltepec the educational level influences the responses.

Assessment of self-perceived efficacy was elicited by asking participants' willingness to change their behaviour to reduce their contribution to climate change. Ninety-four per cent of respondents would be willing to reduce their contribution to climate change, 3% of the respondents say "yes, but individually would not have any effect". Also, 3% would not do so because they believe it will not have any effect. In Consejos Comunitarios Homogeneity Chi-square with sociodemographic factors shows that neither ideology, gender, age, neither educational level nor country has significant association with the willingness to change behaviour.

In Santiago Comaltepec Comaltepec the answer was a constant and all participants are willing to modify their behaviour.

On the same scope, people were asked on the efficacy of and opportunities for people to reduce climate change (Table 8 to Table 10 in Appendix 8). No one in Santiago Comaltepec believes that "humans can reduce climate change", while in Consejos Comunitarios 16 respondents (around 41% of them) agree with that idea. In Santiago Comaltepec (18 respondents) considered that human could reduce it but either it is unclear what it is needed to do so or people are not inclined to change their behaviours (12

individuals). In Consejos Comunitarios four respondents think that there is no opportunity to stop climate change and nothing can be done.

Figure 6-18 and Figure 6-19 show number of respondents agreeing or disagreeing with the statements about efficacy of human actions to deal with climate change.

Figure 6-18 Efficacy of humans' actions for respondents in Consejos Comunitarios

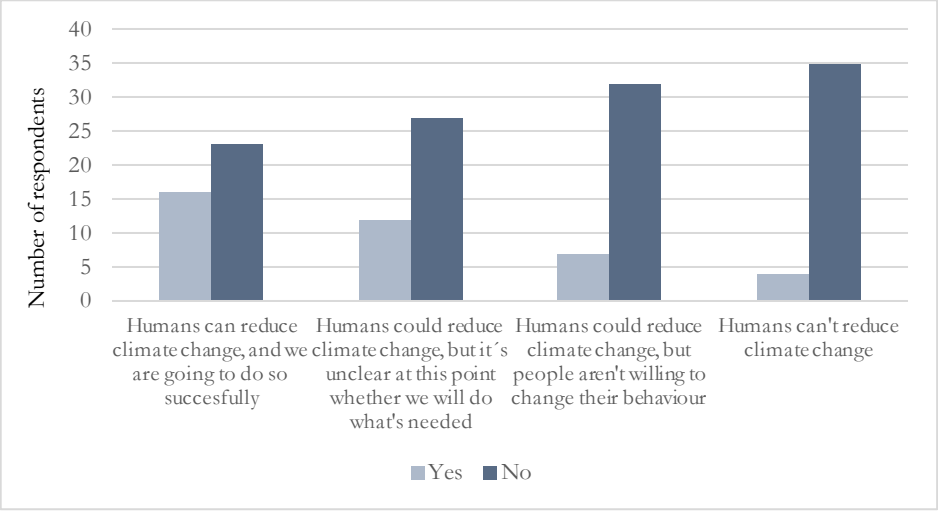
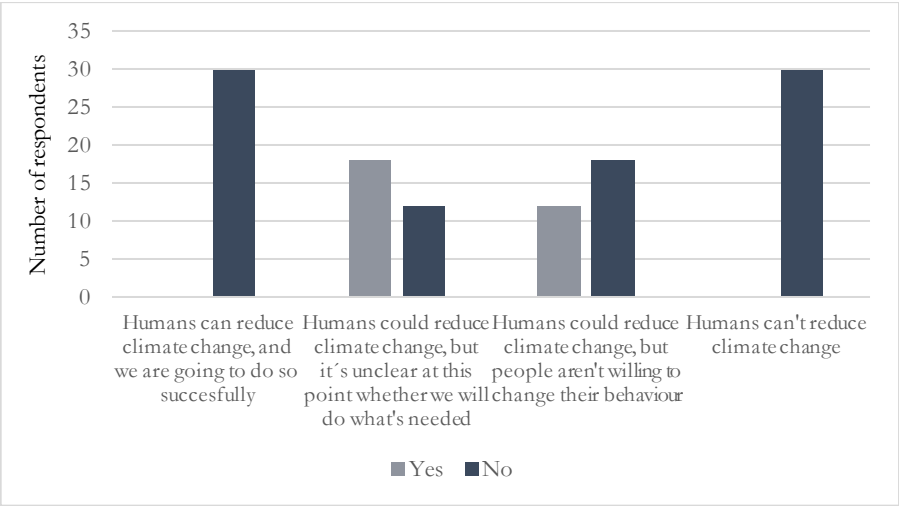


Figure 6-19 Efficacy of humans' actions for respondents in Santiago Comaltepec



For this question, Homogeneity Chi-Square with sociodemographic factors show that neither in Santiago Comaltepec nor in Consejos Comunitarios there is association with age, educational level, gender, and ideology for any of the three statements examining perceive efficacy. However, significant association was found with country $X^2(1)=16.023$, Cramer's

V= .482 and the item people can reduce climate change, and people will succeed in dealing with climate change.

When the respondents is from Santiago Comaltepec nobody agree with people succeeding in dealing with climate change, while if the respondents is from Consejos Comunitarios 41% of them agree with the idea

Additionally, country was associated with the variable people can reduce climate change but it is not clear that people will do what needed to do so $X^2(1)=5.896$, Cramer's V= .292, being the association quite low. In Santiago Comaltepec 40% of respondents agree that it is not clear what it is needed to reduce climate change, while in Consejos Comunitarios 69.2% disagree with that idea.

The statement "humans can't reduce climate change" presents no association with age, gender or educational level in either of the case studies. However, variable country was found to be associated with $X^2(1)=3.266$ with a relatively small effect Cramer's V=.245. For 10.3% of Colombian participants human can't stop climate change, whereas in Consejos Comunitarios no one aligns with this idea.

6.6 Discussing and understanding the quantitative side of climate change perception

In this section findings on the questionnaire are discussed. The questionnaire seeks to complement the results of the Q-Methodology and it quantified the relation between predictors and defining elements of climate change perception. The questionnaire has given insight on how information, environmental attitudes, and cultural bias, shape climate change perception. Figure 6-20 and Figure 6-21 present which factors influence and shape perception of climate change in view of the questionnaire results. Climate change is perceived in a very similar fashion in both case studies. However, differences are seen in terms of their worldviews, the cause of climate change and their information needed about climate change. The terms within the square are predictors of climate change, the concepts in the ellipses are related to management and behaviour, and the ideas in the parallelogram are about information.

Figure 6-20 Perception of climate change in Consejos Comunitarios

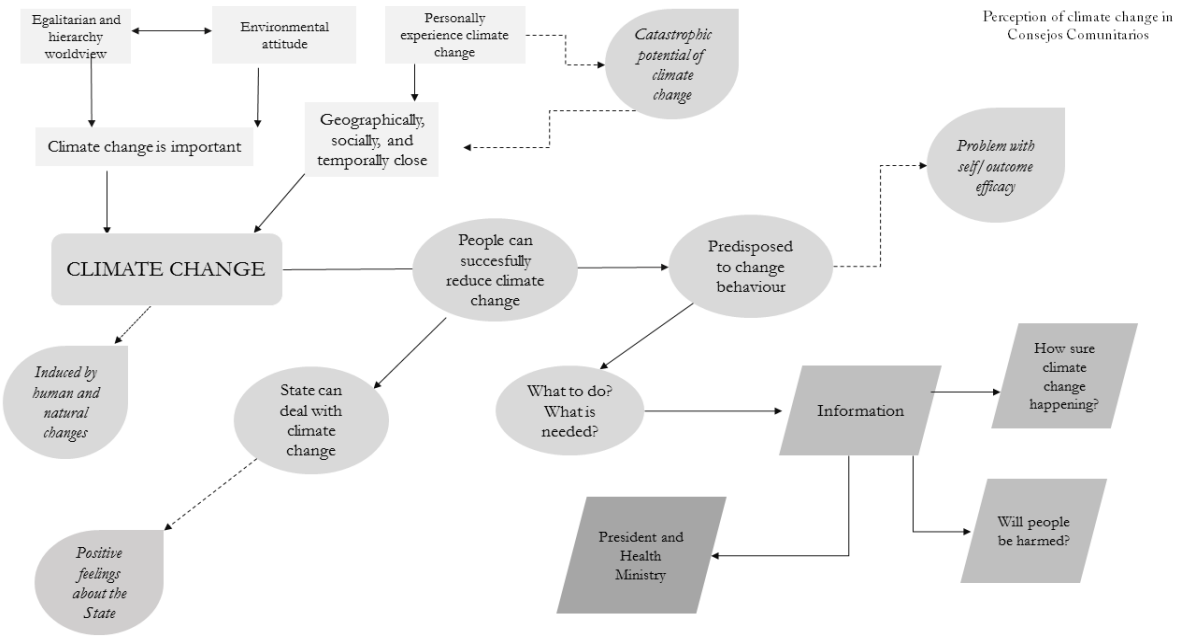
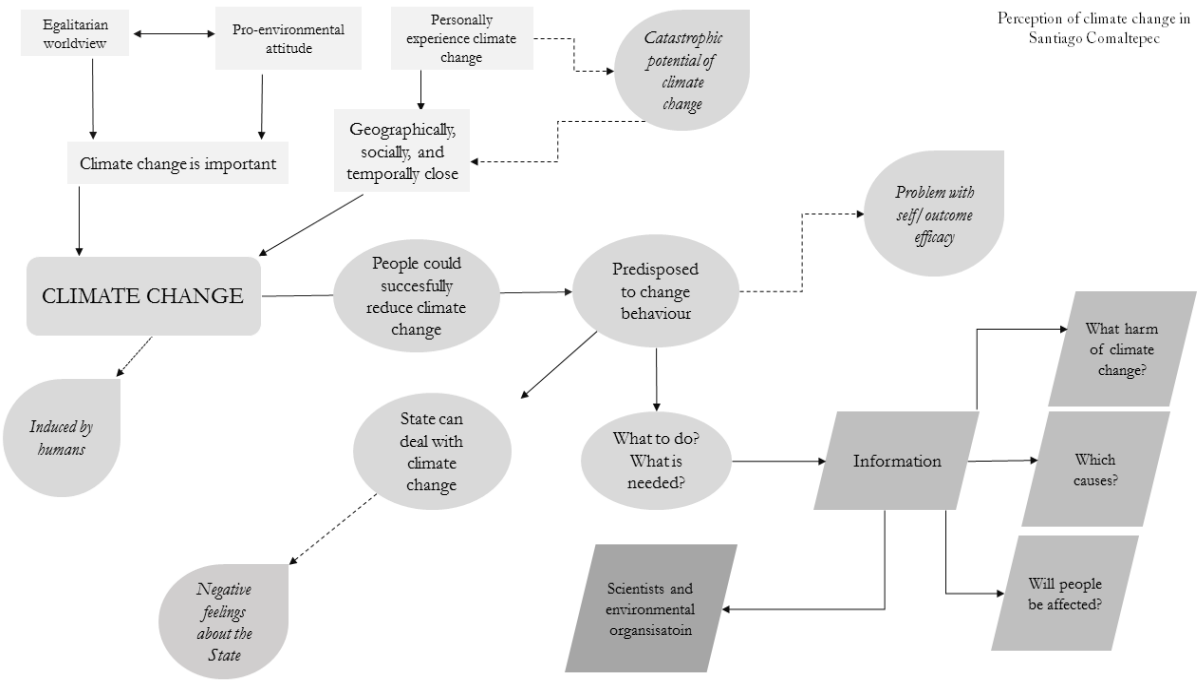


Figure 6-21 Perception of climate change in Santiago Comaltepec



The discussion of the results is explained in a narrative style by comparing and contrasting both case studies. The first section starts describing people's visions on nature and relation with the environment. Secondly, the importance of climate change for people in Santiago Comaltepec and Consejos Comunitarios is described. Then, the type of climate information and reliable climate change sources of information for people in Santiago Comaltepec and Consejos Comunitarios are discussed.

6.6.1 The cultural standpoint shaping human-nature relations

6.6.1.1 Which sociodemographic factors influence their worldviews?

Each of the worldviews proposed by the cultural theory aligns with preferences for management and politics, for the visions of nature, for the economy, and for how people relate with "peers" and "the others" (Douglas 1978, Meader 2002). In many ways Participants' world is constrained by their worldviews. Culture and the associated dimensions influence what people value and think and how they will respond for their call for action. As anticipated it was difficult to categorize people in one single cultural bias. In both cases the mean scores were higher for egalitarianism and people were classified within the limit of having high group (being more cohesive and interrelated within them) and low grid scores (being less subject to external regulations). The country of respondents influences on how the participants scored in the cultural theory scales and therefore having one or other cultural bias. People in the communities move along the egalitarian scope and some of them, mostly from Consejos Comunitarios, approach the limit hierarchy worldview. Thus, their obligations and responsibilities as part of the communities move from egalitarianism to hierarchy. A possible explanation for this is that in Consejos Comunitarios people have a high level of grid (Mamadouh 1999) that is to say they are still subject to laws and regulation from the State bodies, so It is no wonder that the logic behind many of their answers does not align with one single cultural bias (Rippl 2002, Oltedal et al. 2004). And this is understandable. Oltedal et al. (2004) point that people's behaviour is difficult to categorize within one single "ideal type" because people can hold different worldviews in different situations. The rigidness to capture this possibility is still within the theoretical debate about cultural theory.

Also the level of education influences how people score in the cultural theory scales. In this research, people with secondary education scored higher in individualism, people with primary education in fatalism and hierarchy, whereas higher scores in egalitarianism were

found in people with higher education. This finding is consistent with results in other contexts. In 2003 Grendstad and Sundback carried out a study in the Scandinavian countries. There, education was the only sociodemographic variable that correlates significantly with the cultural biases. Results about the influence of education on cultural bias concur with theory. Marris et al. (1998) suggest that people that score higher in egalitarianism, have higher educational qualifications. Also Peters and Slovic (1996) indicated that people with lower and medium level of education would score higher in hierarchy and individualism. Education is one critical sociodemographic factor because it is found to be one of the most important predictor for sustainable behaviours (Steg and Vlek 2009b). In general, in societies with liberal democratic traditions education is found to be associated with individualism and liberal values. Therefore, it is somewhat surprising to find that education predicts the worldviews in the same way in contexts with higher level of social cohesion, social control, and low level of individualism (the individualist rationale is opposed to the logic the CBNRM (Olsson et al. 2004) .

To be a man or a woman from a particular ideology did not significantly influence participants' cultural bias. With the exception of fatalism that does not account for any policy preference, the other three cultural biases have a defined political tendency (O'Riordan and Jordan 1999, Leiserowitz 2003). One could have expected that ideology determine their systems of beliefs or cultural bias. Because it plays an important role in shaping how people understand their social world and it helps to organise information about the political world. Likewise, age is an important determining factor for people structuring their cultural beliefs. With age the way of seeing the world and interacting with it evolves. In this research in spite of the effect not being significant, higher scores for individualist are among young people, for hierarchy and fatalism among elder people while for egalitarianism among middle-aged. This is in agreement with what is suggested by the theory. Jenkins-Smith (1994) proved that young people are expected to be more individualist, and also it should have been expected that age could determine individualism and hierarchy. This might be due to the younger generations being the most educated and being more inclined to independency and freedom. In Santiago Comaltepec the youngest do not want to feel constrained by the traditional rules of the community. Young people disagree and are in discomfort with some traditions such as performing their duties without receiving monetary compensation.

6.6.1.2 How they shape their relation with nature and environmental attitudes?

Cultural worldviews are seen as a good framework to analyse environmental behaviours (Meader 2002). To better portray their visions of climate change it is particularly interesting to see how they perceive and shape their relation with nature. As it has been corroborated by the theory (Steg et al. 2013) and the results in the this research, the study of the ecological worldview can help predicting climate change awareness and whether people effectively see that nature has changed. Deepening into how people feel, behave and think about the environment it is useful to see whether people in Santiago Comaltepec and Consejos Comunitarios are open to modify behaviours.

From their results on the cultural theory scales, it can be inferred that people's vision of nature coincide with an egalitarian worldview of nature: plants and animals have the same right as humans to exist (Thompson 2010). This was expected in view of their dependence on natural resources and it was further corroborated by the scores on the cultural theory scales and NEP. This result could also be scaling-up to a global scale. In 2001 Iwaki found that Latin Americans score higher in the egalitarian scale than Anglo- Saxons.

Since they are mostly egalitarian and they perceive the nature and the environment are fragile and weak for egalitarians (Dake 1992) one would expect that people in the communities endorse an environmental attitude. This is corroborated in the research by the way they performed in the NEP scale. Positive association between egalitarianism and environmental attitudes has been found in other studies. Ellis and Thompson in 1997 corroborated it within social environmental groups in the United States, and it has also confirmed in small and local communities in Portugal and the United Kingdom by Meader 2002 and Lima and Castro 2005 . This means that, for people in these studies the higher the level of egalitarianism the higher the environmental attitude. The research produces results that support findings of a great deal of previous work on indigenous environmental attitude. Several recent studies reveal that indigenous communities have an extraordinary knowledge on natural resources and they show a positive environmental attitude that has proved to be useful to mitigate and adapt to climate change. For example, in 2013 Boillat and Berkes explained how indigenous communities in the Bolivian Andes design their own adaptation strategies based on their ways of interpreting and giving meaning to climate change. In the village of Huslia, Alaska, people rely on traditional knowledge to control wild fires by identifying where the spruces and willows are. If large dense stands are within a close distance of the Village those areas are identified as potential dangerous areas for fires (Brewer et al. 2015). The extent to which people cared about the environment can

also be confronted with the interest people have in fostering the economy. Being from Santiago Comaltepec or Consejos Comunitarios is a very important determining factor in that respect. In Santiago Comaltepec, only when the respondents had secondary education would they prefer to protect the environment. The majority of the people with primary and higher education would prefer a balance between protecting the environment and having more jobs. Here, young and middle aged people would be inclined to have a balance. Elder population state that it would depend on the situation. In Consejos Comunitarios half of the young population and the majority of elder and middle-aged population would protect the environment instead of fostering the economy.

If looking at the results in Santiago Comaltepec, one might think that these contradict what is appreciated in the territory, that in Santiago Comaltepec people have a more conservationist attitude (Markopoulos 1999). However, in Santiago Comaltepec the environmental attitude is higher for those who prefer a balance between having more jobs and protecting the environment. The importance of nature prevails for them. This result could be also explained by that fact that people there have less options for livelihoods than those in Consejos Comunitarios, where people have more economic activities (Escalante Semerena et al. 2012, Farah Q. et al. 2012). Therefore, it is logical that people among the working age are more inclined to promote the economy to find more opportunities.

Despite results show differences between case studies (having the people in Santiago Comaltepec a higher environmental attitude than people in Consejos Comunitarios) in both case studies people endorse a pro-environmental attitude and mostly everybody disagrees with statements related to the superiority of human beings over nature (referring to the Dominant Social Paradigm in the NEP scale).

In Santiago Comaltepec people disagreeing with the idea that resources on Earth are abundant demonstrate that the environmental attitude is built towards a more eco-centric and egalitarian view. For them, there is no division between nature and humans since both are valued equally. In Consejos Comunitarios the vision of nature is closer to the hierarchical typology, if not even to the individualist. For people in Consejos Comunitarios, nature is robust, resilient, and full of resource. For them it could even be "tolerant" if humans treat it correctly (Thompson 2003a). This implies that a good management would make the Earth a good place to live in. In the Colombian case study, almost half of the population believes that humans were meant to rule over nature. This is not unexpected and a possible explanation for this is that the area is full of natural resources and it is highly biodiversed (UNEP 2010).

In Consejos Comunitarios nature is as well delicate and can be easily upset, which means that people should not cross boundaries to interfere with it or at least these should be controlled.

In the both case studies people with higher education tend to have a more pro-environmental attitude than those with secondary education. This coincides with theoretical expectations and other studies (Thomson 2013). The higher-educated people understand better the complex and abstract issues (such as climate change), they are more involved and more motivated to participate in environmental responsible behaviours. Results of the research show no difference between people based on their age. Other studies proved that scores on the NEP scale decline with age (Lovelock 2010) and younger accept environmental attitudes easier than elders (Liere and Dunlap 1980, Thomson 2013). Concerning the gender, women tend to have a more pro-environmental attitude, and this is common to other places such as the United States (Rideout 2014) and indigenous communities in the Waikato region in New Zealand (Thomson 2013). In the study a centre-left or left leaning woman from Santiago Comaltepec, with higher education would endorse the highest pro-environmental attitude of participants in the questionnaire.

People in both communities see nature as part of them, their lives and their culture. In Santiago Comaltepec a high percentage of people mildly agree with the idea that humans can satisfy their needs from nature and in Consejos Comunitarios a great percentage agree with that idea too. Respondents see nature not only as a source for living but also as a part of their day to day life.

6.6.2 Climate change matters to them

6.6.2.1 The scepticism in the communities

An sceptic is characterised i) by perceiving expert disagreement about causes and consequences of climate change, ii) by recognising that climate change is just a natural phenomenon, and ii) by disbelieving that climate change poses a threat (Leiserowitz 2003, Whitmarsh 2011).

Focusing on the first aspect respondents from both communities clearly admit the existence of climate change. Not only do participants think that climate change is occurring, but they also believe that it is caused by human actions. With a closer view through the cultural theory lens, scores for individualism were higher when asserting that climate change is mainly caused by human actions. This contradicts with what is developed

by the theory because individualists attribute climate change mostly to natural causes (Thompson 2003b).

With regard to the origin of climate change small differences are perceived between case studies but results align with what was expected from each cultural bias. Thompson (2003) and O'Riordan and Jordan (1999) describe how the proposed four cultural bias have particular ideas about origins of climate change and how acceptable climate change risks could be for each of them. For egalitarians climate change is due to an unfairness distribution of natural resources and economy, for hierarchy to the excess of population, for individualists to the low prices of natural resources and for fatalists to "randomness". In spite of differing on the source of climate change, for both egalitarian and hierarchy bias climate change is occurring (Thompson 2003b). In Santiago Comaltepec, where people tend to be more egalitarian, the percentage of people attributing the causes of climate change to humans is higher than in Consejos Comunitarios. In Consejos Comunitarios, people tend to be egalitarian-hierarchists, and therefore they attribute climate change to both environmental changes and human causes. Findings about the origin of climate change are consistent with their worldviews and the elements proposed by cultural theory.

However, no evidence was found that environmental attitude could determine the attribution of the origin of climate change. All the same in both case studies people with higher environmental attitudes tend to disagree that climate change is exclusively originated by natural causes. These differences perceived at local level are not observed at a national level. Ray and Pugliese (2011) demonstrate that people in Colombia and Mexico tend to attribute the causes of climate change to human actions. In neither of the cases the occurrence of climate change is denied. The "conflicting issue" is not whether climate change exists, but the source inducing it.

The third characteristic to determine scepticism refers to the threat of climate change. To see if people in the communities feel it as a threat the focus should be on: whether they feel it close and whether they think climate change has a catastrophic potential. One of the reasons why a risk can be relevant for somebody is the closeness or remoteness of the source of risk and the object it impacts (Weber 2006). Neither in Santiago Comaltepec nor in Consejos Comunitarios, is climate change seen as distant. The analysis on the psychological distances shows that people in both case studies feel climate change temporally, socially and geographically close. For the respondents climate change is currently affecting their territory, their country and their surroundings.

According to them, autochthonous flora and fauna and people will be equally impacted by climate change. This was anticipated given that they value equally nature and humans. This reinforces the idea that nature is important for them and is vulnerable to climate change. Also, that climate change is equally felt by them and people in distant locations. In terms of social distance (Spence et al. 2012) the risk of climate change will affect them and their family as much as people in other places. Likewise, they think that climate change will greatly affect third countries. The findings on the study contradict what is found in other research mostly in Western countries: people tend to undermine threats at local level (Lima and Castro 2005). Results confirm that there is a difference between the perceived seriousness of risk at a local level between Western societies and developing countries (Uzzell 2000, Spence et al. 2012) and also between people depending on natural resources.

In the research, there is a relation between the psychological distance established by people and the catastrophic potential of climate change. The closer climate change is perceived, the harder the potential harm would be. Several reports and forums such as the United Nation Permanent Forum on Indigenous Issues corroborate that people depending on natural resources fear and perceived climate change to be harder. Scientific research also validates it. For example, Turner and Clifton (2009) describe that in recent years indigenous communities in the British Columbia have seen a rapid decline in their traditional Salmon species, and people attribute this to climate change. Specifically in Latin America, Ulloa (2008) describe how climate change is affecting indigenous communities in Guatemala and Bolivia and specially women and their traditions.

Aligning with precepts of the cultural theory and the psychometric paradigm catastrophic potential of climate change is related to egalitarianism (Fischhoff et al. 1978). This finding is in agreement with Leiserowitz's (2003) who demonstrated that egalitarians tend to perceive climate change as a threat. In Santiago Comaltepec and Consejos Comunitarios fatalism is inversely related with the potential harm of climate change which was expected in light of the theoretical assumptions. In both cases, the higher the fatalism the lower the potential harm of climate change is perceived (Leiserowitz 2003, Thompson 2003a). Indigenous communities would normally account for the well-being of future generations (Clarkson et al. 1992). In spite of it no relation was found between any of the cultural bias and this risk characteristic. All respondents considered that climate change will harm future generations. Therefore, it can be concluded that people in Consejos Comunitarios and Santiago Comaltepec are not sceptics.

6.6.2.2 Is climate change relevant for them?

Because climate change (might) affect their environment, it could be fair to assert that climate change is important to people in both case studies. Generally, it is difficult to maintain people interest in an issue in short-term unless they are given reasons to remain engaged. People have limited scope for preoccupations and a very limited capacity to worry, they start feeling concern, only if they feel the threat is near (Weber 2006). For people in Santiago Comaltepec and Consejos Comunitarios the environment is part of their pool of worries because they depend on the natural resources for their livelihoods. Therefore the limited concern of people's mind would incorporate how natural resources and climate change may affect their lives.

The importance given to climate change is also related with their cultural biases. For instance, in Santiago Comaltepec there is a negative association with the importance of climate change and hierarchy. The higher the hierarchy level the lower the importance of climate change. People holding a hierarchy bias have a medium level of perceived risk from climate change (Thompson 2003b, 2010), so this could affect the importance they endorse to climate change. In Consejos Comunitarios no relation was found between both variables. This finding is supporting research in this area which found no association between hierarchy and climate change importance (Capstick 2012). The importance of climate change is predicted as well by their environmental attitude. Despite not being statistically significant, when the number of cases is higher (when the analysis was performed joining both data bases) there is relation between environmental attitude and the importance attached to climate change. The higher the environmental attitude the higher the importance of climate change is. Therefore, in case of knowing the environmental attitude, the importance of climate change could be predicted. This is in accordance with the principles of the Value-Belief-Norm theory (Stern et al. 1999) which states that the ecological worldview (NEP) could predict problem awareness and therefore importance to climate change.

As expected climate change is an important issue in both cases and it is confirmed by their environmental attitudes. Analysis shows that the closeness of climate change influences the importance attached. In Consejos Comunitarios and Santiago Comaltepec the nearer climate change is socially and geographically perceived, the higher the importance of climate change is. There is no relation between how close they feel climate change and how concern they are about depletion of natural resources. In the territory this rather contradictory result may be due to the fact that their natural resources are not exhausted.

Both territories are highly biodiverse and in good conservation status (ICSU-LAC 2010, Arbeláez-Cortés 2013).

Hence, people from Consejos Comunitarios and Santiago Comaltepec consider that climate change is important and believe that it is a serious issue.

6.6.2.3 Willingness to change behaviour and to protect the environment

Due to their environmental attitude and the perceived closeness with climate change people in both case studies would respond and confront the effects of climate change. Results show that participants in Santiago Comaltepec and Consejos Comunitarios are willing to change behaviour to reduce their contribution to climate change. The positive inclination for changing behaviours and acting pro-environmentally is the same regardless age, gender, ideology and educational level of the respondents for both case studies. This is congruent with the precepts of the theory of Value-Belief-Norm theory (Stern et al. 1999) that states that people with biospheric values (people caring for the sake of quality nature itself and not for other reasons) will easily engage in environmental beneficial behaviours (De Groot and Steg 2007, Steg et al. 2013). So far, it could be assumed that people in the communities endorse these types of values or at least they are about the environment. These ones could activate the ecological worldviews and in turn awareness of climate change (Stern et al. 1999). Because in Santiago Comaltepec and Consejos Comunitarios they need natural resources for their livelihoods, one could also argue that people in the communities caring about nature is due to egoistic values and self-motives (reflecting concern for oneself). They could look for their own sake instead of the community benefit. As supported by De Groot and Steg (2008) in most of the cases, egoistic behaviours do not give rise to environmental behaviours. But even egoistic values could encourage a pro-environmental behaviour if people identify that the perceived benefits of behaving that way exceed the perceived costs (Stern 2000).

Many studies has evidenced that people in developing countries and in countries with rapid economic development like China (Chen et al. 2011) are inclined to change their behaviours and are engaged in pro-environmental actions and environmental attitudes (Dunlap and York 2008). In 2011 Iwaki found that particularly in Latin-American people tend to support green behaviours.

In spite of their positive attitude to change behaviours, being from Santiago Comaltepec or Consejos Comunitarios determine how efficient people perceived their own actions are. Almost half of the total respondents think that human beings could stop climate change

from occurring, but still they doubt that people will do what is needed. A small percentage of people in Consejos Comunitarios feel that their behaviour will not have any effect.

Consequently, there is no problem with the willingness to be involved in climate change related issues but with the self- and outcome efficacy of people changing their behaviours. That is to say, people struggle to identify which are the actions that reduce the environmental threat and also their own ability to provide relief to environmental threats (Steg and Nordlund 2013).

6.6.2.4 Coping with climate change…alone?

The risk of climate change, is unbounded (Jasanoff 2010). In consequence the stakeholders involved in the climate change conversation varies from local to global scale (Burch and Harris 2013, Messling et al. 2015). Despite the potential of indigenous and small communities to adapt to climate change, the role of the State is crucial in dealing with climate change (UN 1998, IPCC 2013c).

Although they are independent to manage their natural resources, they are constrained by the State and government to a greater or lesser extent. Then, it is important to see whether the authorities and the State are involved in fostering sustainable behaviours. In line with this, the role of the State is acknowledged when the participants admit that the State could afford dealing with climate change. Half of the respondents of Santiago Comaltepec stress this ideaAlmost half of the total respondents think that the role of authorities is positive and helps them behave sustainably. Special attention should be placed on women in Consejos Comunitarios and in middle-aged and elder people in Santiago Comaltepec, because authorities are not seen as collaborative.

Feelings about the State are positive within the Colombian respondents. However, in Santiago Comalpetec feelings are negative. Results align with those expected considering their cultural bias (Douglas 1978, Wildavsky and Dake 1990, O'Riordan and Jordan 1999). According to the theory egalitarianism is negatively associated with the feelings about the State as opposed to hierarchy (O'Riordan and Jordan 1999). For egalitarians, the authority could even be seen as suspicious since they could misuse his power against the common good. These results may be explained by a number of different factors such as their institutional contexts, their differing day-to-day relation with the government. In Consejos Comunitarios many of the decisions still depend on the National government and municipal authorities for regulation and laws, while in Santiago Comaltepec the General Assembly has more scope for action. In Consejos Comunitarios (hierarchy) the acceptance

of external rules and the high level of grid in comparison to Santiago Comaltepec may serve as an explanation for the positive feelings.

In Santiago Comaltepec (where there is higher level of egalitarianism) the strong social cohesion and the influence of social norms, and independence with regards to the State in the decision-making process could help explaining the negative tendency. Also, the fact that they need to comply with National laws and still they want to maintain their space for internal regulation could boost this negative feeling.

6.7 Information of climate change related issues

6.7.1 The message about climate change

Information is key in the process of construction of people's reality. For this purpose, people need knowledge and this can be gained through experience and also through information (Elder-Vass 2012). Information is a key element for adapting to climate change (Archie et al. 2014) and it also determines whether people perceive a threat as a risk.

Results show that there is a perceived lack of information about climate change among respondents. This is more noticeable in the case of Santiago Comaltepec than in Consejos Comunitarios. There is a positive predisposition for participants (even among well-informed people in both Santiago Comaltepec and Consejos Comunitarios) to receive more information regardless their self-perceived level of knowledge they already have. This refutes the hypothesis that in context with high internal cohesion and the bonding relations people tend to limit the knowledge-seeking behaviour (Smith et al. 2012)

It has been demonstrated that information alone is not very effective in promoting environmental behaviours (Steg et al. 2013). Identifying information gaps according to people's needs can be very advantageous because it can increase awareness of climate change and also promote environmental behaviours. This can be achieved by tailoring information and reaching social specific group of people (Daamen et al. 2001). The need for new knowledge about climate change is revealed in the type of question people would ask to a scientist if they had the opportunity. In the case studies there was no influence of the country (being the respondents from Santiago Comaltepec or Consejos Comunitarios) when deciding upon a question. Despite the fact that they feel that climate change will affect them and people around them, the majority of respondents in both case studies seek for knowing if climate change can harm people and if humans are going to be impacted. In Santiago Comaltepec doubts about the origin of climate change also require attention.

Climate change is undoubtedly related to human actions (IPCC 2014c). Yet some doubts emerge in both case studies around the source of occurrences. In Santiago Comaltepec some respondents seek to receive more information about the source of origin of climate change. Unexpectedly, in spite of considering it as an important issue, they would like to know more about the certainty of occurrence of climate change. This reflects the fact that climate change still remains an uncertain issue.

The answers that people seek to know are found to be specific for the groups called by Leiserowitz et al. (2011) "disengaged" and "doubtful" of climate change. Being "disengaged" means that people do not feel climate change is important, do not think humans are causing climate change and do not know if they will be impacted by climate change. The "doubtful" embody the characteristics of the disengaged. They also believe that there is disagreement among scientist about consequences and causes of climate change, and that this is produced exclusively by natural changes.

Categorizing people as such would contradict what this research has demonstrated so far Furthermore, referring to the same author (Leiserowitz 2006) these people could not be regarded as sceptics. Here, ambiguities are found. On one hand, people believe that their communities are currently impacted by climate change. On the other hand, they still feel they want to know whether climate change will impact people. A plausible explanation for this could be that that they are not able to acknowledge that impacts on nature will indirectly affect them. It can also be suggested that either they do not assimilate information about climate change, or the data is not related to what matters to them. A more reasonable explanation is related to social-psychological aspects. In 2012, Smith et al. proved that dependence on natural resources can enhance people's predisposition to learn about impacts of climate change. Therefore, the type of information they demand may not be related to scepticism.

Many of the global changes are difficult to predict, and projections and impacts of climate change are uncertain issues. Moreover, uncertainty cannot always be quantified because other sources of uncertainty can also come from aspects related to language and terminology (Schneider and Kuntz-Duriseti 2002). In the process of construction of people's reality and world, language and discourse shape meaning for social reality (Foucault 1972). Adequate context-adaptations of uncertainty are important because this determines the way people will adapt their behaviours and how they perceive climate change. The impact and the understanding of climate change can be emphasize not only if local data is used (Myers et al. 2013, Reser et al. 2014) but also if the language used is the

correct one for the audience. In a recent report of flood risk communication in the UK, Messling and colleages (2015), demonstrated that people engage with climate change and extreme weather events in their own terms. Consequently, an appropriate use of language for conveying messages about climate change (Nerlich et al. 2010) may help people internalize and understand the reality of climate change.

6.7.1.1 What about the messenger?

The information about climate change that the people in the communities receive and have should be appropriate in quantity and quality. When talking about climate change and the science behind it, the message is as important as the messenger (Malka et al. 2009). Even if the information is well-elaborated and adapted to the context and audience, it could fall on deaf ears if the information sources are not the correct ones. Statistical and scientific data are crucial but trusted " messengers" and even personal experiences are key for achieving public engage with climate change (Messling et al. 2015). The egalitarian bias, governance system within the communities based on trust, reciprocity and legitimacy, would lead to think that the preferred sources of information should be people in their surroundings (Smith et al. 2012, Mwalukasa 2013). Results on confidence in sources of information revealed that in Santiago Comaltepec (having a more hierarchical governance system but people located within the egalitarian cultural bias) trustee sources of information are scientists and environmental organisations. Much less confidence is given to the President and other National public Institutions. However, this should not be surprising if considering their positive feelings about the State. The opposite occurs in Consejos Comunitarios, where most confidence lies in the National Institutions. Here, scientists are not trustee sources of information. The President, the Health Ministry and the Municipality are seen as very reliable information sources. Hierarchical arrangement respects authority and so hierarchical look favourable to whatever could emerge from a "top-down" process. Scientists are trusted by a lower percentage of people, yet still quite high. The radio, TV and media are well valued among respondents.

The role of scientists in the risk society and in the configuration of climate change reality is crucial. They are key stakeholders in the climate change conversation (Burch and Harris 2013). Even if traditional knowledge has proved useful, science is decisive to confront climate change phenomenon (Smith and Sharp 2012). The risk is now "scientified" (Beck 2007). In the risk society scientists provide the information that people use to construe their reality about climate change. People that perceived disagreement among scientist about climate change, tend to be less sure that climate change is occurring (Ding et al.

2011). But in both case studies "the lack of knowledge to scientists" (Fischhoff et al. 1978) is not that. For almost all the participants in the research there is agreement among scientists regarding the occurrence of climate change. Yet people perceive certain disagreement among scientists about the causes and consequences of climate change.

This result, together with outcomes about willingness to change behaviour, importance of nature and the pro-environmental attitudes indicate that people believe that climate change is occurring and perception is configured by elements of their social contexts.

Chapter 7

GENERAL RESULTS AND METHODOLOGICAL DISCUSSION

This chapter is comprised by two sections. The first one provides a summary of the overall results of the research. Perception of climate change in Santiago Comaltepec and Consejos Comunitarios are described in light of what was obtained from applying Q-Methodology and the questionnaire. The second section, discuss the methodological results of the thesis

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7.1 Summary of the research results

This section presents a summary with the research results of both methodologies. The contradictions in the results obtained from the Q-Methodology and the questionnaire can be due to the fact samples are not the same. In any case results of different methods do not conflict but on the contrary they complement each other.

7.1.1 The consensus about climate change

In Santiago Comaltepec the results of the questionnaire, the network analysis and the Q-Methodology confirms that there is certainty that climate change is occurring. For the participants in Q-Methodology there is enough information to ascertain that climate change is occurring and it is caused by human actions. The questionnaire reveals that people consider that most scientists agree with the idea that climate change is happening and only a small part of respondents perceived disagreement about causes and consequences. In Consejos Comunitarios results from the questionnaire and the Q-Methodology coincides when asserting that climate change is occurring but the origin of climate change is attributed to both human and natural causes. In the questionnaire participants perceive agreement among scientists with the idea that climate change is happening. Yet there is a perceived disagreement about the consequences and the causes of climate change.

7.1.2 Climate change is occuring

In Santiago Comaltepec results of Q- Methodology reveals that people consider nature as fragile and delicate and natural resources are not abundant. Therefore a proper management is needed to guarantee their long-term availability. Results of the questionnaire confirm that the prevailing vision of nature aligns with the corresponding type of egalitarian bias.

In Consejos Comunitarios, the analysis of Q -Methodology reflects two divergent views. On the one hand, people acknowledge the delicate character of nature and on the other hand people considering that natural resources are abundant, and nature is robust and resilient. However, the questionnaire shows that most people move along the egalitarian and hierarchy bias. This meaning that nature has their boundaries and there is no space for the indiscriminate exploitation of resources.

In both case studies, definitions of climate change demonstrate that people are unable to separate the "abstract" idea of what climate change is from its impacts. Moreover, they express climate change by linking it with the effects in their communities. The ideas of risk and territory assembly the words composing the climate change definitions. Both Santiago Comaltepec and Consejos Comunitarios acknowledge the influence of human actions and also that climate change given rise to a shift in the communities.

In Santiago Comaltepec when people describe how climate change is felt in the territory words related to plagues and diseases appear in many of the definitions. People tend to mix causes of climate change with consequences, and they use words associated with climate variability to describe the extremes. In Consejos Comunitarios, the words expressing changes in the territory are related to issues like the weather and other environmental matters such as the depletion of the ozone layer.

Results from the network analysis demonstrate that people are already feeling climate change in their communities. This statement aligns with results from the questionnaire but no with those obtained in the Q-Methodology.

In Santiago Comaltepec, testing psychological distance with climate change confirms that neither people consider climate change as a latent construct nor do they think it is going to affect them or their family and their territory. The catastrophic potential of climate change is associated with how close they feel climate change in their lives. In any of the perceptions type climate change is believed to impact their culture and their traditions of their communities. Furthermore, only one perception type contemplates that climate change entail disastrous consequences for the territory.

The situation is similar in Consejos Comunitarios. The questionnaire demonstrates that people feel climate change; they have observed changes in the territory and think that their family, their territory and their country are already being affected by climate change. For them, the closer they feel climate change the higher the risk. The Q-Methodology shows divergent responses. Only the people in one perception contemplate that climate change could have disastrous consequences, affecting animals and plants, and people in other countries. However, climate change could have positive implications for their territory. The three perception types reflect that industrialized countries will suffer the effects of climate change.

7.1.3 Dealing with climate change

In both case studies the results of the questionnaire corroborate that people hold an environmental attitude. Q-Methodology validates results in both case studies. In Santiago Comaltepec, except from the two individuals of perception 3, there is a consensus that people think short term about the environment. In Consejos Comunitarios, the results in the Q-Methodology show that there is one perception type differing from the predominant egalitarian bias and coinciding with individualism. Regardless this, the participants believe that concern about climate change should be increased.

In Santiago Comaltepec participants in Q-Methdology did not acknowledge responsibility for climate change. However, in the questionnaire as in the network analysis it was admitted that human actions can induce climate change. In Consejos Comunitarios individual responsibility for climate change is not recognized which contrast with what was found in the network analysis.

In both case studies, people are inclined to change behaviours to reduce their contribution to climate change. Yet in Santiago Comaltepec, there are some doubts about whether people will do what is needed or even if people will succeed in doing it. The results of Q-Methodology coincide with those obtained in the questionnaire. Not only do the participants think that climate change is a relevant issue, but also that people should be more concerned about it. For them, people in richer countries should be more involved in climate change related issues. At the same time they demand more space for grassroots actions.

In Consejos Comunitarios, the questionnaire demonstrates that almost half of the respondents believe that humans will successfully reduce climate change. Nevertheless, a small number of people considering that climate change cannot be stopped from occurring. The Q-Methodology displays some differences. The participants in Q-Methodology consider that people in richer countries should be more involved in climate change related issues but they do not mention the role of the community could play.

The results of the Q-Methodology in Santiago Comaltepec demonstrate that climate change should be on the political agenda, and it should not be left to future actions. The industries and the government should be better involved too. They highlight the importance of combining action from people in richer countries and people in the communities. The results in the questionnaire concur with the idea that the State should be better involved and it currently could afford dealing with climate change. For participants

in the questionnaire, the authorities help them to behave sustainably. There are a similar amount of people considering that authorities have a pro-active role in helping them to behave sustainably.

From the results of the Q-Methodology in Consejos Comunitarios it is revealed that climate change should be a priority on the political agenda and the municipality should be better prepared for coping with it. Here, the population is divided among those considering that the authorities help them to behave sustainably and those who do not. They demand more involvement from the industry and people from industrialized countries. Yet, they do not ask for space for participation.

7.1.4 The information about climate change

In Santiago Comaltepec a majority of people is not well informed but they want to receive more information. In that respect they want to know when climate change will harm people and what is causing climate change. However, the role of media and environmental organisations are positively valued and science is not seen as a reliable source of information about climate change nor is the government.

In the Colombian case study participants who are not very well and fairly well informed about climate change are positive with the idea of receiving more information. To that respect, they are seeking to know whether climate change will harm people and also how sure scientists are about the occurrence of climate change. Here, scientists and environmental organisations are the most reliable sources of information even if the radio, TV and media are well valued too. Participants in Q-Methodology consider that they need more information about climate change. They perceive disagreement among scientists, and so they mistrust science as sources of climate change information. For them there is a need to prove that humans are causing climate change.

7.2 Methodological Discussion

To meet the methodological objectives discussion on cultural theory, new environmental paradigm and Q-Methodology performance on the research are discussed. An analysis of the application of the cultural theory and new environmental paradigm in the community-based contexts are provided. The Q-Methodology is analysed in the basis of the experiences and comments of respondents and also considering the process of designing and implementing the methodology.

7.2.1 About the use of cultural theory on the research

According to the cultural theory assumptions, people could be classified into the grid group matrix (Figure 2-1 in Chapter 2) according to their respective cultural bias. This was done based on the responses to each cultural theory items in the questionnaire. In this thesis, the scales were composed considering the traditional theory assuming unidimensionality of each of the cultural theory scales. The analysis was carried out for each case study individually but to see the effect of higher sample size, the analysis was also completed clustering both databases.

Results of the study show strong and positive correlations between items for each subscale and their corresponding index. This means that each index shows a good correspondence with the cultural bias that each item is supposed to represent. The individualist items were mostly associated with in the hierarchy scale and also egalitarian scale. However, one individualist item correlates with one fatalist item. Apart from this, one fatalist item did correlate with one hierarchy item. For the hierarchy scale, the most noteworthy association is given with egalitarianism. Either positively or negatively, items strongly correlate with each other. This relation could be expected as they share their adherence to the group but differ in the degree of compliance with external standards imposed (grid). All the items in the hierarchy scale are associated with the egalitarian index. Items for the egalitarian scale barely relate to the other scale indexes, which demonstrate that egalitarianism is a clear dimension in the study. Items in the individualist scale are positively related to hierarchy index. From correlation analysis, it seems that fatalist index and corresponding items are not related with any of the other three cultural theory scales. This meaning that fatalism is works independently.

There is no clear prediction on how cultural theory scales should correlate with each other. However, based on Rippl's assumptions (2002) and considering how grid and group dimensions are related, significant negative correlation should have been found in cultural bias on one or two opposing dimensions, and weak correlations should have been found in

neighbouring cultural biases. Therefore, hierarchy and individualism should negatively correlate, as fatalism and egalitarianism. Contrary to the precepts of the cultural theory but coinciding with other studies (Dake 1991, Marris 1996, Xue et al. 2014), hierarchy and individualism yield a strong positive correlation. Dake (1991) did not test results on fatalism. However, subsequent studies reported that fatalism correlates with both individualism and hierarchy (Rippl 2002). This relation in the study is barely found, as there is not a clear and strong relation between fatalism and hierarchy or individualism. Likewise and contrary to what was expected from theory, the correlation was found significant with fatalist and egalitarianism in the case of Consejos Comunitarios.

Reliability of the scale (whether the different scales were stable and equivalent) was tested with Cronbach's alpha. The scale performed successfully for fatalism in the three possible cases (Santiago Comaltepec, Consejos Comunitarios and when joining databases together). Also, egalitarianism exhibited greater internal consistency than the reported individualist scale (with alphas falling below .20).

The validity of the scale was tested trough two procedures, PCA and hierarchical cluster analysis. Results on the confirmatory PCA show that items for each cultural theory scales do not load into one single factor each. In Santiago Comaltepec, only the egalitarian scale loads into one single component and individualist and fatalist items are grouped together. In Consejos Comunitarios fatalists items are grouped together only with the "interference" of one egalitarian item. With this exception, the egalitarian items are gathered together, and individualist items are together with hierarchy items. Then, if the PCA was performed clustering databases, individualists and hierarchy items load together, but individualist items are also grouped with one fatalist item in the fourth component. Egalitarian items here load into the same component except for one item.

The difficulty in distributing each item into one single dimension per each cultural type is corroborated by the results found in the hierarchical cluster analysis. In Santiago Comaltepec individualist and fatalist items cluster together, but also individualist and hierarchy items. In Consejos Comunitarios fatalist and individualist items grouped together, and egalitarian items clustered together with items of the other scales. Individualist items are split into the different clusters. Results differ when databases are together, and it is hierarchy the only scale whose items are split. Therefore depending on the case and the analysis performed, hierarchy and individualist items are divided into different component/cluster. Even if items show a random distribution, some patterns can be identified. Individualist and hierarchy items as well as individualist and fatalist items are in

the same component/cluster. Additionally, items for the egalitarian and fatalist scales group together.

One reason why items load together without following the theoretical assumptions might be due to the fact that these measures do not have an adequate level of construct validity. That is measures are not able to explain differences between the scales. In a similar situation Meader (2002) suggest that it is also possible that PCA and the cluster analysis have identified a valid theoretical pattern that makes distinct items of the four cultural worldviews to conform a new bias.

From the results, it was observed that the worldviews are connected even though they did not share any of the grid and group characteristics. It is difficult to establish a common pattern of distribution of items, and this could be in line with the idea that cultural worldviews are not separate compartments, but they are all interrelated. This also reflects that cultural theory, despite its usefulness, fails to grasp the nuances of people's cultural standpoints. This would contradict Douglas' idea of how cultural types are clearly distinguishable (Douglas 1992) and support the idea that people can hold different worldviews in different situations (Oltedal et al. 2004). However, it is also possible that instead of competing worldviews, these may complement each other (McNeeley and Lazrus 2014).

7.2.2 Usefulness of the scale to classify individuals

Worldviews are multidimensional when individuals are used as a unit of analysis (Marris 1996). That is to say, worldviews are conformed based on different elements from different cultural typologies. This assumption is verified by the results of the data analysis demonstrating that individuals do not fit into one single cultural type (Douglas and Wildasky 1982). First, it was difficult to categorise individuals in one cultural bias. It is convenient to recall that the main purpose of the cultural theory is to understand as a whole how the social contexts could influence perception of risk (2.3.2 in the theoretical framework of the thesis) and it was not intended to measure cultural bias at individual level (Douglas and Wildasky 1982). Surprisingly, in the Mexican case individuals scored higher in one single cultural bias, corresponding to the egalitarian worldview. As it has already been discussed this might be due to the strong social cohesion within the community and the reluctance to be open to external influences. The results in Consejos Comunitarios confirmed what Marris et al. (1998) found in their study: it is challenging to classify individuals in one single cultural bias. More than 50% of the sample in Consejos Comunitarios shared the characteristic of two or three worldviews (egalitarianism,

hierarchy and fatalism). If the cultural theory were measured at the individual level, it would need from a qualitative perspective to be able to understand better which elements characterised people's cultural worldviews. As Rippl (2000) stated, measuring the cultural theory through scales is indeed an indirect measure of cultural processes. Therefore, a qualitative analysis would be needed to fully comprehend the cultural settings as a whole.

Higher scores were found in egalitarianism that coincides with the characteristics of the population and the peculiarities of their contexts. Lower scores were found for the items in the fatalist scale. The governance system is not the sole determinant factor in people's understanding of the world. However, some characteristics of the CBNRM in the territories such as trust, accountability and justice, equity, sense of belonging to a group, the reduced size of the community and the strict social control (in the case of Santiago Comaltepec) have a key role in people's understanding and constructing their reality.

The cultural theory was also used in relation to the risk characteristics of climate change proposed by the psychometric paradigm. Here, it was observed that the four cultural theory scales give significant value to the study of risk behind climate change. Fatalism has not been included in many of the discussions about climate change risk, environmental attitudes and cultural theory (Marris 1996, Ellis and Thompson 1997, Thompson 2003a). More recently, Capstick (2012) included one fatalist item in the study of climate change perspectives. The role of fatalism should not be dismissed. Fatalism turns to be significantly associated with the catastrophic potential of climate change. As it could have been expected, the relation was negative. When assessing the lack of knowledge to those exposed, fatalism was significantly correlated with the variable. Hence, the more a person would lack knowledge of climate change, the more fatalist he/she is.

All mean scores for the four cultural biases were higher in both case studies when agreeing with the idea that humans are the cause of climate change. Results also coincide with theory as the mean is higher for individualism when considering that the climate change is induced by natural changes in the climate system. Disagreeing with the statement that climate change is induced by both human and natural causes will lead to higher means for hierarchy, fatalism and egalitarianism.

Considering the "preferences" in the terrain of climate change per cultural bias (Thompson 2003a) it is not strange to consider that higher scores for hierarchy and egalitarianism are given when agreeing that humans caused climate change. Surprisingly, the mean is higher when agreeing with the statement also for fatalist. For fatalists, the occurrence of events is

arbitrary (Jenkins-Smith 1994). Hence, higher means should have been attributed to natural changes (Hoogstra-Klein et al. 2012).

Findings somewhat suggest that the four cultural scales should be included for further examination of climate change perception in CBNRM contexts. This would benefit from other techniques such as personal interviews and focus group so that cultural setting would be understood in its completeness.

7.2.3 About the use of New Ecological Paradigm in the research

Although the sample might be small in comparison with other studies, it is not the first time that NEP scale has been applied to a reduced sample (Davey and Vertrees 1999). The scale was composed of 14 items, instead of the 15 original items. Different versions of the scale have been used with various Likert scales too (Hawcroft and Milfont 2010a). In the study published in 2000 by Dunlap and colleagues, the revised NEP scale performed pretty well with an internal consistency of alpha .83. Results correlate with ideology, education, and gender. As in the original, high scores reflect an endorsement of the NEP; low scores reflect rejection-but an only indirect endorsement of the DSP. The scale shows a good level of consistency being better in the Mexican case than in the Colombian one. As expected because the number of cases was greater, when the databases were grouped the internal consistency was higher. Because the rational for effective CBNRM needs is set up on higher environmental concern, as expected the results show that people tend to agree more with an item of the NEP side of the scale. This means that respondents have a pro-environmental attitude. Given their dependence on natural resources, not holding a pro-environmental behaviour would have been surprising. Nevertheless, the respondents believe that humans can ensure that life on the planet can still be sustained, which could lead to think that human interfering with nature does not give rise to negative outcomes for nature too.

As mentioned in the section chapter 2, the NEP scale has been treated as one single measure despite the fact that it treats different facets and dimensions. The same as for the cultural theory, the NEP scale was explored at items level. It was observed by both the PCA analysis and the hierarchical cluster that items are not grouped based either on the paradigm indicators (Dominant Social Paradigm and New Environmental paradigm) or the facets (Antianthropocentrism, Limits to growth, Ecocrisis, Balance of Nature and Antiexemptionalism). Theoretical assumptions did not coincide with what was found in the research. The reason for items to gather together follows another pattern. The fact that items were mixed within clusters and also in different components could make us think

that some of the items reflect the same ideas and are not distributed according to the respective facets. Looking at how items were distributed within the cluster in the case of Consejos Comunitarios and clustering databases, it could be observed that items grouped with a certain rationale. For instance, cluster 2 groups items related to human abilities to control and dominate the abundance of natural resources over nature. Whereas cluster 1 groups items related to the mild equilibrium of nature and how the fragile equilibrium could result in disastrous consequences if humans interfere in a perverse and uncontrollable manner.

It is also important to examine how the statements of the NEP scale were understood in the research and how appropriate the statements are in contexts such as the one of this study. In spite of not having obtained a higher number of DK/ NA responses, many of the words in the scale reflects certain vagueness. In general, the number of DK/ NA responses was not high in the case of NEP scale. In Santiago Comaltepec, a higher number was located in item 13, "The earth is like a spaceship with very limited room and resources "which coincides with the item that did not fit into the one cluster obtained for this case study. It is important to mention that the word "spaceship" was not included in the Spanish translation. Many other studies point that the use of the metaphor may lead people to ignore and dismiss the item (Arcury and Christianson 1990, Lalonde and Jackson 2002). Some other concerns appear in relation to the use of terminology in the items that may give rise to a high number of DK/NA responses or misunderstandings. In the Item Q11.2 "When human interferes with nature it often produces disastrous consequences," the word interfere has a negative connotation. What does interfere mean exactly? Is "interfering" the same as interact?. In the research contexts people "interfere" with natural resources for a living so this intervention with nature is a need. Despite this, the percentage of agreement with this issue was relatively high for both case studies. Also in the item Q11.3 "Humans are severely abusing the environment" the word "abuse" could be ambiguous. Does abuse mean a mismanagement of environmental resources or depletion? The meaning of abuse may not be the same as in societies that do not rely on natural resources, in the case studies resources are the basis for their livelihoods. The same apply to the item Q11.14 "Humans will eventually learn about how nature work and will be able to control it" Differences in meanings may emerge considering contexts and local specificities. It is long accepted that not only indigenous people but those communally manage environmental resources have a good knowledge of cycles of nature and have developed good conservation practices

(Western and Wright 1994, Berkes 2007). It seems that item Q11.14, for instance, may not be appropriate for contexts where people rely on climate-sensitive resources.
Applying NEP scale in contexts as such of the thesis would benefit from including update wording and more specific terminology, specific for CBNRM singularities.

7.3 Usefulness of Q-Methodology in the research

The Q-methodology allowed eliciting information and exploring the various climate change visions within and between the case studies. Q-methodology combines and facilitates the best of top-down and bottom-up approaches in research (Doody et al. 2009). This is one of the advantages of using Q-Methodology (Ramlo 2008). Applying this methodology unables to confirm that climate change perception and understanding may differ not only across local contexts but also within them as worldviews do.
In the acceptance of the working method by the participants, some differences appeared linked to their familiarity with methodological tools as such, but the methodology was well received by participants. Many of the respondents used the additional space on the Q-sort sheets devoted to including clarifications as to why they selected some statements and to describe their experience in the process. It was a good exercise to raise awareness of environmental and climate change issues and helped to display environmental problems. One participant from Consejos Comunitarios stated, "*It is useful for making visible awareness of natural resources and to see the relationship between them and the community.*"
This methodology helps other respondents to realize about the "distance" between people and climate change. In Santiago Comaltepec another repondent wrote that "*climate change is here and it is affecting animals around*" also in Consejos Comunitarios one participant acknowledged that "*the exercise was really useful because it allowed me to see how humans give rise to changes in the environmental and how little is done to control it*".
Irrespective of all this, some other issues should be borne in mind. Some respondents experienced difficulties in understanding the method and in rank-ordering the statements and some in Santiago Comaltepec refused to finish the Q-sorting as it was too demanding. Many of them were elder people with difficulties in reading and understanding Spanish. They highlight that forced distribution limits the possibility of free ranking and ordering of statements. They pointed that it required a double effort to prioritize, value statements and to order them in a forced distribution. To assist participants, researchers then helped them to write the numbers in the grid. The forced distribution may present some advantages, moreover when the research topic is not in their daily lives or social imaginary (Watts and

Stenner 2012). However, it has also been observed that sometimes participants in Q found a problem in prioritizing some statements over others (Doody et al. 2009). The forced distribution should also be reconsidered when the statements come from secondary sources, as in the case of the thesis. This point requires particular attention. In Q-Methodology, it is essential for people to feel the appropriateness of the concourse. One of the limits during the Q-sorting and a possible cause of fatigue might be due to not extracting the statements from personal interviews or focus groups. Therefore, having a forced distribution together with statements from secondary sources could prevent participants to be fully engaged in the exercise. Gathering people from rural communities to participate in this type of exercise might entail some difficulties too. Having undertaken the research in the frame of a project eased this situation as counting on the support of contact points such as researchers, leaders, and authorities who facilitated the participation. However, gathering people from rural communities to participate in this type of exercise might be complex in other situations where the researcher lacks a support structure. A reference and reliable person from the community could be needed to better access to people.

Chapter 8

CONCLUSIONS AND FINAL CONSIDERATIONS

8.1 Contributions of the thesis to the field of climate change perception studies

Climate change poses challenges to goals for social and economic policy, such as growth, equity and sustainable development, but also to the governance systems responsible for controlling the phenomenon of climate change and responding to its impacts. Currently, climate change is widely perceived as threatening the long-term resilience of societies and communities worldwide, but particularly to the most vulnerable, like the people whose livelihoods are exposed to changes in weather patterns.

The study addresses a significant research gap in the climate change literature: the analysis of the local perception of climate change communities dependent on natural resources in countries affected by climate change. Furthermore, it explores it in communities, whose livelihoods depend on natural resources and manage them communally. *The aim of this thesis has been to identify the social imaginary of climate change in communities that depend on natural resources and manage them collectively.*

The research has proved that climate change perception is influenced by the social and cultural context and the environmental attitudes. The values, the symbols and language and the institutions (their social imaginary) for each community influence and determine the visions of climate change.

Overall results of the thesis have proved that people in communities dependent on natural resources are already experiencing changes in the environment, probably due to climate change. Most of them produce imagery of impacts on places and people who are both closer and spatially distant to them and also in non-human nature. Thus, the research results suggest that the communities in Santiago Comaltepec and Consejos Comunitites fully consider climate change as a threat. The majority of people acknowledge the influence of human actions inducing climate change. They display support for national and local policies and interventions to tackle climate change that goes in line with the institutional structure in their territories. Strong majority exhibits concern about natural resources and the environment and therefore they will be willing to change behaviours.

This thesis provides valuable information about opportunities and challenges of consultation with local communities. It confirms that people dependent on natural

resources perceive changes in the environment and in their resources. This entails a risk for their livelihoods and well-being.

The thesis presents a novel vision of involving local communities in natural resource management and climate change adaption by using the Q-Methodology. Results and discussions have shown that climate change is a relevant issue. They feel it close and they are willing to change their behaviour to contribute less to climate change.

8.1.1 What does this thesis tell us about the influence of social context in perceiving climate change?

For constructing their visions of climate change people in the communities make use of their experience, their knowledge and the language in the surroundings. The perception varies with the experience with the phenomenon. People admit that climate change is occurring and their territory is currently feeling the effects of (what they believe it is) climate change. Also, the idea of climate change is created based on their knowledge about the natural resources the language and words they use. The use of scientific terminology together with their own expressions shapes their understanding and sometimes leads to misunderstanding of the causes and consequences of climate change.

Some coinciding and differing elements are appreciated that corroborate that climate change and environmental hazard perception differs according to local circumstances and individual preferences in communities dependent on natural resources. Their collective management of the resources, their communal agreement for their use, and their internal institutional arrangements coincide in both cases with an egalitarian worldview of nature and climate change. The sense of caring about nature and the environment is due to their shared worldviews (egalitarianism/hierarchy) but also their environmental attitudes. The closeness to nature and their dependence on the natural resources make people in the communities behave sustainable and give importance to climate change.

Nevertheless, the social and the political peculiarities (and also the state of natural resources) can determine differences in creating their perception of climate change. Their values as members of a community and the arrangements and cohesion within their social structure settle preferences for management climate change issues. The differences in the governance system and the degree to which the individuals are inserted into the systems can help explaining why some preferred different climate change management options. The relation with external and National institutions also influences who should lead an

"acceptable" climate change strategy. The autonomy from these institutions might determine the extent to which people will be willing to participate in dealing with climate change in the communities. It has been observed that people in the communities request the government to be more involved in climate change issues. This proved that they feel empowered and able to adapt to climate change. The degree of involvement required is not homogenous and it varies with gender, education, and age. The more independent and autonomous the more the degree of involvement is.

These facts show the complex assembly of configurations that make up a viewpoint and the fact that individual preferences may be reflected by perceptions too.

Information is seen as an important barrier to climate change engagement and understanding. Miscommunication and misinformation are critical factors in perpetuating doubts and uncertainty of climate change. Often, the information fails to be effective because it does not convey what matters to the audience.

In spite of the amount of information about the causes and consequences of climate change, there is perceived uncertainty about these topics. Culture and traditions are key for communities closely related to the environment. Indigenous people have their own words and their knowledge both to explain and to manage the resource. Thus preservation of the heritage is crucial. However, people seem to dismiss how climate change could impact their culture and tradition. Therefore, the messages about climate change impacts should be locally tailored, including information about how the social and cultural dimensions could be affected by climate change.

Like for the quantity of information provided the mistrust in sources of information poses an important issue for credibility to traditional stakeholder in the climate change conversation, like scientists, authorities and policymakers. Particularly for CBNRM contexts the scientific community and especially the government should engage in a more efficient dialog with people in the communities to overcome this situation. They should seek to transmit reliable information to them and to put more efforts on communicating the scientific acknowledgment about climate change origins and consequences. Finding ways to restore confidence should become a priority for public institutions (local and national authorities) and the scientific community.

8.1.2 What does the research tell us about the methodology in the study?

8.1.2.1 About the cultural theory and the NEP scale

The combination of the constructivist approach, together with theories –cultural theory and new environmental paradigm- and methods –Q-methodology, network analysis and questionnaire- proved to be suitable. The different methods allow reinforcing the perceptions of the participants and also contrasting counterintuitive and different results, what validates the hypothesis that climate change perception is socially constructed.

The cultural theory provides a good framework for choosing suitable context-adapted guidelines to deal with climate change. It helps to identify their view about nature, their preferred sources of information, and the most suitable options for managing and adapting to climate change in the communities. Difficulty for creating index for hierarchy, fatalism, and individualism suggest that the measures used in the research did not adequately distinguish these worldviews among the population of the study. To either support or refute this finding it is advisable to test the measures within the same population and other communities with similar characteristics. The egalitarian worldview was well recognised in both contexts and the index was successfully created. Therefore, it leads to the conclusion that egalitarian dimension is the predominant view in contexts where collective management and property prevail.

The new environmental paradigm gives a suitable hint to explore environmental attitudes. The scale is a first approximation to measure attitudes, but it does not properly reflect how environmental attitudes are conceived for people living in different contexts of Western societies. Most of the items in the original scale can be used in CBNRM contexts. Yet some modifications and adaptations should be made considering the particular case where it is going to be applied. Considering the particular cultural and social characteristics differing from the traditional Western thought, to fully comprehend how the worldviews influence on perception of climate change and how environmental attitudes are conceived, the cultural theory scale and the NEP scale should be accompanied by qualitative and descriptive research.

8.1.2.2 About the use of Q-Methodology

The research validates Q-Methodology as an advantageous participative technique for CBNRM contexts. The process delivers outcomes of interest for various collectives. For the communities, it fostered a reflection process that increased awareness about the environmental situation in their communities. Furthermore, they could identify desired

actions to implement to cope with climate change and the role they can play. The whole process contributed to strengthening the communities' capacities. For policymakers and the local authorities, it delivered information about which type of actions in climate change adaptation policies would be more accepted by communities (e.g. the importance of grassroots strategies). The use of Q-Methodology assessed people's evaluation about the authorities and the level of trust on them. For researchers, it provided an accurate reflection of the broad spectrum of perceptions that form the social imaginary within the communities. It also gave feedback about their views on the science of climate change. By stating the level of trust, the Q-Methodology evaluates their role as scientists and the perceived image. This can be useful to identify which aspects should be improved in relation to the quality of information produced. This could be of great help for designing and exploring social research about climate change for including cultural and context-adapted requirements.

8.2 **Recommendations for policy-makers and the scientific community**

A number of implications and recommendations emerged from this research in view of results and discussion of the thesis. The main recommendations for this research are:

- To recognise the local cultural specificities and not to impose one-size-fits-all climate change adaptation strategies. This research has proved that even in communities with similar characteristics there are divergences in the way people perceive climate change. These differences are not only seen between communities but also within them.
- To involve society and end-users of natural resources in management and adaptation policies for coping with climate change. As a global issue climate change requires actions from different stakeholders worldwide. Most of the mitigation strategies are carried out globally, but adaptation strategies should be locally adapted recognising people's ways of understanding the climate change phenomenon and their relation with the environment
- To engage society in the necessary changes in behaviour without imposing actions and strategies. A way of involvement can be by stressing that it is in the hand of people to adapt and to tackle climate change, and that consensus exists on which strategies are required for it. Likewise, the use of participatory techniques and

tailored design methods are useful to increase awareness of environmental issues and climate change. By including people in the process of deciding solutions for climate change, they can feel their opinions and values are crucial for designing climate change related strategies. This process can increase trust in policy-makers and scientific community. Moreover, it can rise their willingness to behave sustainably.

- To deliver clear and trustful information about climate change to enhance public understanding. Many of the aspects related to causes and consequences of climate change still remain uncertain. This entails a barrier to engage with climate change. In spite of the uncertainties efforts should be made to show that climate change is occurring and affects people. People in the communities are familiarized with climate change and perceive changes in the environment. Several reports and scientific research recognised that traditional knowledge together with scientific knowledge can be effective in dealing with climate change. Nevertheless, information about which are the adequate strategies to deal with climate change seems not to be received by people.
- To find ways to restore the confidence in the messages delivered by policymakers and scientists. Lack of trust in sources of information may prevent people from acting to confront climate change. Climate change perception studies in indigenous and social cohesive communities have proved that people tend to believe in their peers to receive information about climate change. Additionally, in communities with long tradition of work with civil society organisations and research groups, scientists and environmental organisations are seen as trustful sources of information.
- To adapt the information channels and methods to deliver information of climate change and related policies to the different cultural contexts and cultural biases. In communities like those included in this thesis, it can be very useful to use visual methods for showing how human actions impact the environment (i.e., livelihood activities that can endanger the environment), how the environment in their territory has changed and how potential effects of climate change could transform their communities.

8.3 Research limitations and improvements

While the research represents a significant contribution to the field, it also suffers from inevitable limitations. The study sample was not the same for the Q-Methodology and the questionnaire. This could explain the cases in which the visions of climate change related issues did not cohere. For future research it is advisable to see the consistency of their responses, having the same sample for Q-Methodology and the questionnaire.

In terms of generalization and inference of the results of Q-Methodology the study presents the personal opinions and views of the selected participants. As explained in Chapter 4 generalisation can generate doubts, but it does not present a limitation for the studies that using this methodology. Q-methodology tends to capture the viewpoints of the participants of the research. Q-Methodology generalization does not limit validity (as in statistical and psychological terms) of the study results.

Q-Methodology could be a thoughtful exercise and sometimes an overwhelming process that requires concentration. Some inconsistencies were found in the responses which make dismiss 4 of the q-sorts in the Colombian case study.

Since Q- Methodology is rather an individual exercise, inconsistencies might be related to individual characteristics. Some differences could emerge in terms of educational level and familiarity with methodology. Low educational levels and the consequent difficulty in understanding statement could influence in performing well during the q-sort. However, there are some ways of overcoming this barrier. For example, if the study is using images or words, instead of statements, difficulties might not be found in terms of educational level.

The study would have benefitted from having a higher sample in the questionnaire. The number of questionnaire responses was limited and some of the results were not statistically significant. A possible explanation for this is the reduced sample size. The study used the Q-Methodology to compensate this restriction. It would have been of great help to include space for comments and recommendations at the end of the questionnaire. However, this would have made the questionnaire excessively long.

When analysing the answer, some items in the questionnaire presented an important number of missing values. The missing values were mean substituted. Even though there are some other practices to compensate for the missing data, mean substitution is a defensible practice in the field of psychology and when the psychological scale has strong level of internal consistency.

Despite the piloting state, some of the participants mentioned that the questionnaire was too long. For convenience reasons, it was piloted with experts, but to pilot it *in situ* with further checks by people from the communities could have led to better results. Time constraints and access to the communities hindered the task.

8.4 Further research

The research has thrown up many questions in need of further investigation.

- The research focused on two communities in Mexico and Colombia. Future research should extend this type of analysis to other communities within the countries, including national samples with different sociocultural characteristics to have an in depth analysis that could be nation-representative.
- The questionnaire did not assess the cohesion degree of the community. Given the collective management and property of the land and the natural resources, it might be interested to include a measurement of people's attachment to the community. After the necessary adjustments this could be assessed by using a psychological measure of place attachment (William and Vaske 2003) or by assessing the psychological sense of community scale of McMillan and Chavis (1986).
- For further exploration on the worldviews population, it would be interesting to replicate the research in a population with similar characteristics using both the NEP scale and the cultural theory. This could also enhance the understanding about how the items are grouped together and the identification of potential worldviews.
- Future research with Q-Methodology with the communities should be done with statements from primary sources. This is advisable when the goal is to explore each case study individually.
- A clear path to take further research is to implement the study with the adjustments and recommendations made in this chapter. For example, after providing communities with locally-based information about climate change. Also after adapting the language of cultural theory and new environmental paradigm and deleting items in both scales causing a higher number of missing values to see if reliability and validity could increase. This could help to validate the use of both theories.

- Further research could also include different measures to test on the visions and relation with nature. For example by including the Connectedness of Nature scale by Mayer and Frantz (2004), studies could incorporate the effects of personality in connection with nature. This scale proves that connection with nature is an important predictor to ecological behaviour and it is also related to NEP scale. It would be useful to incorporate the so-called Myths of Nature (Thompson et al. 1990, Dake 1992) into further studies on the field to better integrate cultural theory with environmental views.

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APPENDICES

Appendices as noted in the thesis and corresponding to the Q-Methodology and survey section are incorporated here.

LIST OF APPENDICES

Appendix 1: Climate change definitions

PARTICIPANT	STUDY AREA	AGE	ORIGINAL CLIMATE CHANGE DEFINITION	ENGLISH CLIMATE CHANGE DEFINITION
1	CONSEJOS COMUNITARIOS	24	Las transformaciones del medio ambiente	Changes in the environment
2		18	No Answer	
3		28	No Answer	
4		22	Es cuando se cambia de un clima a otro por ejemplo del sol a la lluvia	It happens when there are changes from one to another climate, for example from sun to rain.
5		35	Cuando cambia la temperatura cuando un cambio en la atmosfera	temperature changes when there is a change in atmosphere
6		35	Cambia mucho nuestra temperatura	Our temperature changes very much
7		80	No Answer	
8		43	En esos cambios que se presentan en nuestra sociedad como en el nevado del rio, los volcanes más lluvias todo	In those changes that take place in our society as in the snow" of river, volcanos plus rains, everything
9		51	El cambio climático es en el tiempo de antes como el de ahora	Climate change now is the same as it used to be in the past
10		52	Es la transformación de la naturaleza, como le digo la desaparición de mucho animales y las tantas tormenta que haya, por ejemplo cuando no siembra una mata de abono hoy en día se le seca	It is transformation of nature, as I say, disappearance of many animals and the many storms that may take place, for example if you sow without using fertilizers the plants nowadays grow dry.
11		52	Es la transformación de la naturaleza por la falta de compromiso de las personas y por falta de conocimiento de impactos de los mismos	It is transformation of nature due to lack of compromise of persons and lack of knowledge on its impacts.
12		28	Por culpa de nosotros los seres humanos por arrojar basura. Hay muchas inundaciones contaminaciones y la capa de ozono se está destruyendo	It is our fault, human beings' fault, because of the way we littering. There are many floods, contamination and the ozone layer is being destroyed.
13		60	Son cambios de temperatura que da el medio ambiente	They are temperature changes caused by environment
14		26	Cuando se produce uno desordenes ene l espacio climático, cuando se altera de alguna manera todo el tiempo atmosférico	when one takes place, there are perturbances in the climatic space, when in some way all atmospherical weather becomes altered
15		28		
16		23	Es la deformación de cambios bruscos que se presentan en nuestra tierra por ejemplo fenómeno de El Niño o tiempo de	he deformation of brusque changes appearing in our country, for example the Niño phenomenon or

Participant	Study area	Age	Original climate change definition	English climate change definition
			lluvia que en estos momentos se presentan con mayor frecuencias en nuestras comunidades	raining season which presently appears more frequently in our communities.
5		23	No Answer	
18		21	Cuando estamos en verano y de un momento a otro entramos a invierno y así sucesivamente.	When we are in summer and from one to another moment we come into winter and so on.
19		57	De la naturaleza o cambio del clima	Of nature or climate change
20		51	Que tanta contaminación nuestra capa de ozono se está perdiendo	due to high contamination our ozone layer is vanishing
21		52	Es un fenómeno que se ha venido acrecentando en el planeta por muchas razones entre las que se encuentran perdida de cobertura vegetal, aumento de lluvias acidas, efecto invernadero y deterioro de la capa de ozono que conlleva el Cambio climatológico en el mundo, donde zonas que eran altamente	It is a phenomenon which has been increasing in our planet for many reasons, among which you find: the loss of vegetation coverage, increase of acid rains, greenhouse effect and deterioration of ozone layer as a result of climate change.
22		40	Cambio climático son modificaciones que ha sufrido la naturaleza la mal uso que le damos y esto repercute en el clima, con las lluvias, calores, etc.	Climate changes are modifications experienced by nature due to bad use we make of it and this affects climate with rains, heats, etc.
23		35	Yo creo que el cambio climático son los cambios de temperaturas las catástrofes que se viven tanto en mi país como en muchos países (inundaciones, derrumbes)	I think that climate change is the temperature changes and catastrophes which take place both in my country and many countries (flooding, landslides)
24		53	Por el daño que le hemos hecho a la naturaleza se ha destruido la capa de ozono y esto afecta ya que el sol da con mayor fuerza en el territorio	Because of the damage we have caused the nature the ozone layer has been destroyed and this affects because the earth is more exposed to sunbeams
25		31	No Answer	
26		43	Son los cambios repentinos que se presentan en nuestro ambiente referente al clima, ya que en ocasiones estamos ardiendo de calor y de repente empieza a caer la lluvia	They are the sudden changes appearing in our environment referring to climate, because sometimes we are facing extremely hot temperatures and suddenly it starts raining.
27		59	Son los resultados que se presentan cuando hay tala de árboles y fabricas que hacen que haya mucho calor	They are the results which appear when there are feelings of trees and factories activity causes very hot temperatures.
28		50	es el calor intenso que se siente en un lugar donde antes hacía frio	It is the heavy heat you feel in a place where the temperature was previously cold.
29		60	A raíz de la contaminación se ha deteriorado la capa de ozono lo cual hace que los rayos solares lleguen con más fuerza a la tierra, alterando en cierto modo los ecosistemas	As a result of contamination there has been a deterioration of the ozone layer and due to it, sunbeams reach the earth more strongly thus altering the ecosystems in some way.

Participant	Study area	Age	Original climate change definition	English climate change definition
30		47	Es el cambio del clima respecto a los calores es debido a las quemas y talas forestales esto hace que la capa de ozono sea destruida y el sol sea más intenso coso que afecta los nacimientos y las quebradas pequeñas ya que se secan	It is climate change in respect to heats due to forest burns and felling, as a result of which the ozone layer becomes destroyed and the sun is more intense, thus affecting growing of plants as they are dried up.
31		30	Son los resultados del mal manejo de que ha llevado en la naturaleza como tala de bosque súper explotación de recursos no renovables contaminación atmosférica , residuos solido entre otros, esto ha traído es inundaciones, sequias intensivas lluvias exageradas entre otras	This is the result of the bad handling carried out in nature, such as forest felling, excessive exploitation of non-renewable resources, atmospheric contamination, solid refuses among others; all this has resulted in flooding, intensive long droughts, heavy rains
32		23	Son los cambios bruscos que presenta la temperatura	They are sudden changes in temperature
33		50	Es el recalentamiento global que está presentando la tierra y que de un momento a otro la lluvia caen en rayos y descargas eléctricas	It is global warming which the earth is undergoing and from one to another moment rain starts falling in rays and electric discharges
34		43	El cambio climático es lo que vemos ahora ya que antes los ríos era más caudalosos, el sol no calentaba como calienta ahora los glaciares se han ido derritiendo. Todo esto debido al cambio climático	Climatic change is what we see now, as rivers in the past were more water abundant, the sun did not heat so much as now, glaciers are melting. All this is due to climate change.
35		63	Son los cambios repentinos que se presentan cuando ha habido sequía y de repente se viene una tormenta	They are the sudden changes appearing when there has been a drought and suddenly a storm comes
36		45	Debido a la destrucción el mal uso y abuso de la naturaleza cambia el clima hace más calor y se reseca la tierra	Due to destruction, bad use and abuse of nature, climate changes, it is much hot and the earth is dried up
37		50	Las olas de calor que han aumentado las pocas lluvias aumento de la intensidad de los rayos del sol	Heat waves which have increased, less rains, increase in intensity of sunbeams
38		80	Cuando se está en época de calor y de repente se viene el aguacero y nos quema los sembrados	When we are in warm season and suddenly a heavy rain comes and burns the sown grounds
39		78	No tiene idea clara sobre ello	He has no clear idea about it
40		26	Es el resultado de las acciones que ha realizado el ser humano con la naturaleza	It is the result of the actions taken by human being with nature
41	Santiago Comaltepec	27	Actitud de las personas en cómo hemos perjudicado a nuestro planeta	Attitude of persons about the way we have damaged our planet
42		39	La variación del tiempo (clima) en cierto grado extremo	Variation of weather (climate) to an extreme rate
43		18	Alteraciones en el ambiente que afectan a la naturaleza, lluvias extremosas, calor intenso y viceversa	Alterations in the environment affecting nature, heavy rains, intensive heat and contrariwise

Participant	Study area	Age	Original climate change definition	English climate change definition
44		68	Se debe por el descuido de nosotros, la tala del bosque. Hay más tormentas hay torrenciales. Cambio extremosos del clima.	It is due to our lack of care, forest felling. There are more storms, torrential rains. Heavy climate change.
45		28	Son cambios que pasan en la naturaleza como el clima	They are changes occurring in nature like climate
46		28	Hay cambios muy bruscos en el comportamiento del tiempo. Se oye más terremotos, sequias e inundaciones	There are very abrupt in weather behaviour. More news about earthquakes, droughts and floods
47		60	Ya no es como antes ha bajado la producción del campo hay más enfermedades la gente ya no quiere comer cosas del campo. Hay mas calor	Now it is not like in the past, production in agriculture has dropped, there are more diseases, and people do not want to eat things produced in the country. Temperature now is much warmer
48		45	Las fuertes aguas y el repentino calor-las temporadas varían y no llueve a su tiempo	Heavy rains and sudden heat - seasons vary and it does not rain in due time
49		54	Que a veces llueve mucho, a veces no. Varía mucho el clima la producción es menos o más variable	Sometimes it rains heavily, at times it does not. Climate changes very much, production is lower or more variable.
50		46	Son los cambios bruscos y repentinos de los tiempos (calor-lluvia-vientos) del modo extremo que afectan la producción y la salud	It is the abrupt and sudden changes of weather (heat-rain-winds) that affect production and health
51		38	De que se calienta la tierra , hace más calor, de repente llueve fuera de tiempo, sequias prolongadas o lluvias extremas	the earth grows warm, it is much hotter, it suddenly rains out of season, long lasting droughts or heavy rains
52		21	Cambio de la naturaleza. Cuando hay lluvias y calor excesivo alteraciones ambientales	Changes in nature. When there are rains and excessive heat the result is environmental alterations
53		43	Que con el cambio llueve más o no hay lluvia , hace calor demasiado o frio demasiado y hay enfermedades que antes no había	as a result of climate change, it rains more or there is no rain, either heat or cold weather are too much and there are diseases which were non-existent in the past
54		21	Son las lluvias a destiempo , calor excesivo, sequias, enfermedades y plagas…dicen los abuelos que antes no era así	It is rains out of time, excessive heat, droughts and plagues...Old people say that in the past it was not so
55		39	Es el modo que ha cambiado el clima, los temporales de lluvia, de sequía y el frio extremoso. Hay más plagas en plantas y más enfermedades en los seres humanos.	It is the way climate has changed, the long rainy spells, droughts and excessive cold weather. There are more plagues in plants and more diseases in human beings
56		53	Los cambios bruscos de temperatura y la aparición de muchas enfermedades en exceso o calor exagerado	Abrupt changes of temperature and the arising of too many diseases or excessive heat

Participant	Study area	Age	Original climate change definition	English climate change definition
57		48	Que ya llueve mucho o a veces no hay lluvia y hace mucho frio y las plantas ya no crecen y ya no hay frutos	It is raining too much and sometimes there is no rain and it is very cold and now the plants do not grow and there are not any fruits
58		69	Hay muchas enfermedades, llueve a destiempo, hace calor o frio exagerado y todo ese cambio que no había antes	There are many diseases, it rains out of time, both heat and cold weather are excessive and all this change which was non-existent in the past
59		52	Hace más calor y llueve de modo exagerado y hay más plagas y más enfermedades	It is much hotter now and it rains in a heavy way and there are more plagues and more diseases
60		37	El cambio extremoso del comportamiento del tiempo	the hard change in weather behaviour
61		22	Es el cambio exagerado del tiempo	It is the heavy change of weather
62		71	no es lo mismo de hace 30 0 40 años actualmente hay cambios bruscos inesperados de los temporales, del tiempo climas y lluvias	It is not the same as 30 or 40 years ago. At present there are unexpected abrupt changes of long rainy spells, of weather, climates and rains
63		28	Que las lluvias ya están contaminadas. Ya hay más enfermedades por los excesos de lluvia y sequia	Rains are already contaminated. We already have more diseases because of excessive rains and droughts
64		36	Son comportamientos extremosos del tiempo, heladas, sequias y mucha lluvias Enfermedades nuevas	They are extreme behaviours of weather, frosts, droughts and much rain. New diseases
65		35	Son los cambios bruscos que hay en las estaciones del año ocasionadas por las diversas actividades del ser humano. Muchas veces los países más ricos son los que más contaminan y menos acciones implementan. Patrocinan cumbres y otras cosas pero lo que se necesitan son acciones con política	They are the abrupt changes which take place in the seasons of the seasons of the year caused by the different activities of human being. Rather often the richest countries are those contaminating more and carrying out less actions. They use to patronize top international meetings and other things
66		61	Que ha variado el tiempo, se pone fuera del temporal. Ya no llueve normal	Weather has changed, out of season Nowadays the way it rains is not normal.
67		18	Cambios muy bruscos de temperatura, mucha lluvia y lluvias acidas que provocan pérdidas y enfermedades en seres humanos plantas y animales.	Very abrupt changes of temperature, too much rain and acid rains causing losses and diseases in human beings, plants and animals.
68		48	Las lluvias ya producen enfermedades en las plantas porque llueve exagerado y algunas veces hay sequia	Rains are already causing diseases in plants because sometimes it rains very heavily and on other occasions there is drought
69		50	Que hay cambios bruscos de temperatura	There are abrupt changes of temperature
70		40	Las temperaturas varían mucho y llueve más o hay sequia es muy variable el tiempo	Temperatures vary excessively and it rains more or there is draught. Weather is very variable

Figure 1 Frequency between codes for climate change definition

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1.Abrupt changes	0	0	0	0	18	0	0	1	2	0	2	2	1	1	2	1	0	3	0	2	0	0	3	0	0	0	1	0	0	0	0	0	0	3	43
2Acid rain	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	4
3.Caused by humans	0	0	0	0	7	0	2	0	0	0	0	0	0	0	1	0	0	1	0	0	0	4	0	0	0	1	1	0	0	0	0	0	0	0	19
4.Caused by nature	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5. CCDefin	18	1	7	1	0	5	9	6	7	2	9	10	3	11	11	2	7	19	1	19	1	8	11	5	4	8	4	1	1	1	5	3	7	6	2166.
6.Change in climate	0	0	0	0	5	0	0	0	0	0	0	2	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
7. Change in nature	0	0	2	0	9	0	0	0	0	0	0	1	0	1	1	0	0	2	1	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	22
8.Change in seasons	1	0	0	0	6	0	0	0	0	0	1	0	1	0	0	0	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	14
9.Change in temperature	2	0	0	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1310
10.Change in weather	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
11.Changes from previous situation	2	0	0	0	9	0	0	1	0	0	0	1	0	1	0	0	0	2	0	4	0	0	1	0	0	0	0	0	0	0	1	1	1	2	26
12. Climate variability	2	0	0	0	10	2	1	0	0	0	1	0	1	0	2	1	0	1	0	2	0	0	1	0	0	0	0	0	0	0	1	1	1	0	27
13. Cold	1	0	0	0	3	1	0	1	0	0	0	1	0	1	2	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	15
14. Diseases	1	0	0	0	11	0	1	0	0	0	1	0	1	0	2	0	1	0	0	8	0	0	3	0	3	0	0	0	0	0	0	0	1	1	34
15. Drought	2	0	1	0	11	1	1	0	0	0	0	2	2	2	0	0	1	8	0	3	0	0	3	0	1	0	1	0	0	1	0	0	1	1	43
16Extremes changes	1	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6
17. Heat weave	0	0	0	0	7	0	0	1	0	0	0	0	1	1	1	0	0	3	0	2	0	0	1	0	1	0	0	0	0	0	0	0	1	0	19
18. Heavy Rains	3	0	1	0	19	1	2	0	0	0	2	1	1	0	8	0	3	0	0	4	0	0	3	0	0	0	1	0	0	1	0	1	2	1	55
19.Lack of commitment of society	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
20.Link with Territory	2	0	0	0	19	0	1	2	2	1	4	2	1	8	3	1	2	4	0	0	0	0	0	1	3	1	0	0	0	0	1	1	0	0	59
21.Melting glacier caps	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
22.Misuse of natural resources	0	0	4	0	8	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	1	1	0	0	0	0	0	1	0	21
23. Mixing causes with consequences	3	1	0	0	11	0	1	1	1	0	1	1	1	3	3	0	1	3	0	0	0	3	0	2	0	3	1	0	0	0	0	1	3	2	47
24. Ozone layer	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	4	0	0	0	0	2	0	0	0	16
25.Plagues	0	0	0	0	4	0	1	0	0	0	0	0	0	3	1	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
26. Pollution	0	1	1	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	4	0	0	1	1	0	0	1	0	0	0	25
27.Rain	1	1	1	0	4	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	13
28. Responsibility of rich countries	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3
29.Risk situation	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
30. Risk situations	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
31.Sun	0	0	0	0	5	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	0	0	0	0	0	1	0	12
32.Temperature	0	0	0	0	3	0	0	0	0	0	1	1	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	9
33.Warmer temperature	0	0	0	0	7	0	0	0	0	0	1	1	0	1	1	0	1	2	0	0	0	1	3	0	0	0	0	0	0	0	1	0	0	0	19
34.Weather	3	0	0	0	6	0	0	0	0	0	2	0	1	1	1	1	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	19

Table 1 Words for each category in climate change definitions in the Spanish original version

Cambios		Clima y tiempo		Tiempo		Riesgo		Atmosfera		Extremos		Mala gestión		Cantidad		Territorio	
ALTERA	1	**CLIMA**	11	**CALOR**	14	**INUNDACIONES**	4	**ATMÓSFERA**	1	**EXCESIVO**	2	**ARROJAR**	1	**MAYOR**	2	**ENFERMEDADES**	11
ALTERANDO	1	**CLIMAS**	1	**CALORES**	2	**CATÁSTROFES**	1	**ATMOSFERICA**	1	**EXTREMO**	2	**CONTAMINACIÓN**	3	**MEDIO**	2	**NATURALEZA**	11
CAMBIA	4	**CLIMATICO**	1	**FRIO**	5	**CAUDALOSOS**	1	**ATMOSFÉRICO**	1	**EXTREMAS**	1	**DESCUIDO**	1	**MENOS**	2	**PLAGAS**	2
CAMBIADO	1	**CLIMÁTICO**	5	**LLUEVE**	10			**OZONO**	6	**EXTREMOSAS**	1	**DESORDENES**	1	**MUCHOS**	2	**PLAGAS**	1
CAMBIO	15	**CLIMATOLÓGICO**	1	**LLUVIA**	9	**SEQUIAS**	4			**EXTREMOSO**	3	**BASURA**	1	**MAL**	3	**SALUD**	1
CAMBIOS	15	**CALIENTA**	2	**LLUVIAS**	14	**SEQUÍAS**	1			**EXTREMOSOS**	1	**CONTAMINACIONES**	1	**MAS**	3		
VARÍA	1	**CALOR**	14	**RAYOS**	3	**SEQUIA**	3			**INTENSO**	3	**CONTAMINADAS**	1	**MUY**	3	**ÁRBOLES**	1
VARIABLE	2	**CALORES**	2	**CALENTABA**	1	**SEQUÍA**	2			**REPENTINO**	1	**CONTAMINAN**	1	**MUCHAS**	6	**ANIMALES**	2
VARIACIÓN	1	**FRIO**	5	**CALOS**	1	**DERRITIENDO**	1			**EXAGERADO**	5	**RESIDUOS**	1	**MUCHO**	7	**ASÍ**	2
VARIADO	1	**LLUEVE**	10	**SOL**	5	**TERREMOTOS**	1			**FUERA**	2	**DAÑO**	1	**AUMENTO**	2	**BOSQUE**	2
VARIAN	2	**LLUVIA**	9	**TEMPERATURA**	7	**DERRUMBES**	1			**FUERZA**	2	**USO**	2	**INTENSIDAD**	1	**RIOS**	1
MODIFICICACIONES	1	**LLUVIAS**	14	**TEMPERATURAS**	2	**TORRENCIALES**	1			**REPENTINOS**	3	**QUEMA**	1	**INTENSIVAS**	1	**TIERRA**	5
TRANSFORMACION	1	**RAYOS**	3	**TEMPORADAS**	1	**HELADAS**	1			**EXAGERADAS**	1	**QUEMAS**	1	**MUCHA**	1	**AMBIENTE**	4
TRANSFORMACIÓN	1	**CALENTABA**	1	**TEMPORAL**	1	**AGUACERO**	1			**EXCESO**	1	**FABRICAS**	1	**AUMENTADO**	1	**FRUTOS**	1
ALTERACIONES	2	**CALOS**	1	**TEMPORALES**	2	**ACIDAS**	1			**EXCESOS**	1	**TALA**	4	**BAJADO**	1	**PRODUCCión**	3
TRANSFORMACIONES	1	**SOL**	5	**TIEMPO**	14	**ÁCIDAS**	1			**BRUSCOS**	9	**ABUSO**	1	**FUERTES**	1	**SEMBRADOS**	1
ANTES	7	**TEMPERATURA**	7	**TORMENTA**	1							**DESTRUCCIÓN**	1			**ABUELOS**	1
DEFORMACIÓN	1	**TEMPERATURAS**	2	**TORMENTAS**	2							**DESTRUIDA**	1			**SIEMBRA**	1
DESAPARICIÓN	1	**TEMPORADAS**	1	**INVIERNO**	1							**DESTRUIDO**	1				
PERDIDAS	1	**TEMPORAL**	1	**VIENTOS**	1							**DESTRUYENDO**	1				
PERDIENDO	1	**TEMPORALES**	2	**VERANO**	1							**DETERIORIO**	1				
		TIEMPO	14									**DETERIORRADO**	1				
		TORMENTA	1														
		TORMENTAS	2														
		INVIERNO	1														
		VIENTOS	1														
		VERANO	1														

Table 2 Quotations of climate change defitnitions for Network analysis

List of current quotations (183). Quotation-Filter: All	**HU: Words to describe climate change Edited by: Super**	
1:1 las transformaciones del medio.. (2:2)	33:2 Es el recalentamientoo globa q.. (2:2)	54:4 son las lluvias a destiempo , .. (2:2)
4:1 Es cuando se cambia de un clim.. (2:2)	34:1 El cambio climático es lo que .. (2:2)	54:5 plagas (2:2)
4:2 s cuando se cambia de un clima.. (2:2)	34:2 El cambio climático es lo que .. (2:2)	55:1 es el modo que ha cambiado el .. (2:2)
5:1 Cuando cambia la temperatura c.. (2:2)	34:3 glaciares se han ido derritien.. (2:2)	55:2 es el modo que ha cambiado el .. (2:2)
5:2 Cuando cambia la temperatura c.. (2:2)	34:4 Todo esto debido al cambio cli.. (2:2)	55:3 ay mas lpagas en plantas y mas.. (2:2)
6:1 Cambia mucho nuestra temperatu.. (2:2)	34:5 el sol no calentaba como calie.. (2:2)	55:4 lpagas en plantas (2:2)
6:2 Cambia mucho nuestra temperatu.. (2:2)	35:1 son los cambios repentinos que.. (2:2)	56:1 los cambios bruscos de tempera.. (2:2)
8:1 En esos cambios que se present.. (2:2)	35:2 son los cambios repentinos que.. (2:2)	56:2 los cambios bruscos de tempera.. (2:2)
8:2 envado del rio, los volcanes (2:2)	36:1 Debido a la destrucción el mal.. (2:2)	56:3 enfermedades en exceso (2:2)
8:3 lluvias (2:2)	36:2 Debido a la destrucción el mal.. (2:2)	56:4 calor exagerado (2:2)
9:1 el cambio climático es en el t.. (2:2)	36:3 destrucción el mal uso y abuso.. (2:2)	56:5 os cambios bruscos de temperat.. (2:2)
9:2 el cambio climático es en el t.. (2:2)	36:4 cambia el clima hace mas calor.. (2:2)	57:1 que ya llueve mucho o a veces .. (2:2)
10:1 Es la transformación de la nat.. (2:2)	37:1 las olas de calor que han aume.. (2:2)	57:2 que ya llueve mucho o a veces .. (2:2)
10:2 s la transformación de la natu.. (2:2)	37:2 las olas de calor (2:2)	57:3 las plantas ya no crecen y ya .. (2:2)
10:3 tantas tormenta que haya (2:2)	37:3 umentado las pocas lluvia (2:2)	57:4 llueve mucho o a veces no hay .. (2:2)
10:4 desaparición de mucho animales.. (2:2)	38:1 Cuando se está en epoca de cal.. (2:2)	58:1 hay muchas enfermedades, lluev.. (2:2)
11:1 Es la transformacion de la nat.. (2:2)	39:1 no tiene idea clara sobre ello.. (2:2)	58:2 todo ese cambio que no habia a.. (2:2)
12:1 Por culpa denosotros los seres.. (2:2)	40:1 es el resultado de las accione.. (2:2)	58:3 hay muchas enfermedades (2:2)
12:2 contaminaciones (2:2)	41:1 Actitud de las personas en com.. (2:2)	58:4 llueve a destiempo, hace calor.. (2:2)
13:1 Son cambios de temperatura que.. (2:2)	41:2 Actitud de las personas en com.. (2:2)	59:1 Hace mas calor y llueve de mod.. (2:2)
13:2 Son cambios de temperatura que.. (2:2)	42:1 La variación del tiempo(clima.. (2:2)	59:2 Hace mas calor y llueve de mod.. (2:2)
14:1 Cuando se produce uno desorden.. (2:2)	43:1 Alteraciones en el ambiente qu.. (2:2)	59:3 enfermedades (2:2)
14:2 Cuando se produce uno desorden.. (2:2)	43:2 lluvias extremosas, calor inte.. (2:2)	59:4 y hay mas plagas y mas enferme.. (2:2)
16:1 es la deformación de cambios b.. (2:2)	44:1 Se debe por el descuido denoso.. (2:2)	60:1 el cambio extremoso del compor.. (2:2)
16:2 es la deformación de cambios b.. (2:2)	44:2 Se debe por el descuido denoso.. (2:2)	60:2 el cambio extremoso del compor.. (2:2)
16:3 que se presentan en nuestra ti.. (2:3)	44:3 Cambio extremosos del clima. (2:2)	61:1 es el cambio exagerado del tie.. (2:2)

List of current quotations (183). Quotation-Filter: All	HU: Words to describe climate change Edited by: Super	
18:1 Cuando estamos en verano y de .. (2:2)	44:4 tormentas hay torrenciales (2:2)	61:2 es el cambio exagerado del tie.. (2:2)
18:2 Cuando estamos en verano y de .. (2:3)	45:1 Son cambios que pasan en la na.. (2:2)	62:1 no es lo mismo de hace 30 0 40.. (2:2)
19:1 de la naturaleza o cambio del .. (2:2)	45:2 Son cambios que pasan en la na.. (2:2)	62:2 no es lo mismo de hace 30 0 40.. (2:3)
19:2 de la naturaleza o cambio del .. (2:3)	46:1 Hay cambios muy bruscos en el .. (2:2)	62:3 hay cambios bruscos (2:2)
20:1 que tanta contaminación nuestr.. (2:2)	46:2 Hay cambios muy bruscos en el .. (2:2)	62:4 teporales, del tiempo climas y.. (2:2)
20:2 que tanta contaminación nuestr.. (2:2)	46:3 Se oye más de terremotos, sequ.. (2:2)	63:1 que las lluvias ya están conta.. (2:2)
21:1 es un fenomeno que se ha venid.. (2:2)	46:4 sequias e inundaciones (2:2)	63:2 que las lluvias ya están conta.. (2:2)
21:2 es un fenomeno que se ha venid.. (2:3)	47:1 Ya no es como antes ha bajado .. (2:2)	63:3 hay mas enfermedades (2:2)
22:1 Cambio climático son modificic.. (2:2)	47:2 Ya no es como antes ha bajado .. (2:2)	63:4 los excesos de lluvia y sequia.. (2:2)
23:1 yo creo que el cambio climatic.. (2:2)	47:3 Hay mas calor (2:2)	64:1 Son comportamientos extremioso.. (2:2)
23:2 cambios de temperaturas (2:2)	47:4 ha bajado la producción del ca.. (2:2)	64:2 Son comportamientos extremioso.. (2:2)
23:3 (inundaciones, derrumbes) (2:2)	48:1 Las fuertes aguas y el repenti.. (2:2)	65:1 Son los cambios bruscos que ha.. (2:2)
24:1 por el daño que le hemos hecho.. (2:2)	48:2 Las fuertes aguas (2:2)	65:2 Son los cambios bruscos que ha.. (2:2)
24:2 Por el daño que le hemos hecho.. (2:2)	48:3 epentino calor- (2:2)	65:3 ocasionadas por las diversas a.. (2:2)
24:3 se ha destruido la capa de ozo.. (2:2)	48:4 temporadas varian (2:2)	65:4 Muchas veces los países más ri.. (2:2)
26:1 Son los cambios repentinos que.. (2:2)	49:1 que a veces llueve mucho, a ve.. (2:2)	66:1 Que ha variado el tiempo, se o.. (2:2)
26:2 Son los cambios repentinos (2:2)	49:2 que a veces llueve mucho, a ve.. (2:2)	66:2 Ya no llueve normal (2:2)
26:3 nuestroa ambiente (2:2)	49:3 producción es menos o mas vari.. (2:2)	66:3 Que ha variado el tiempo (2:2)
27:1 Son los resultados que se pres.. (2:2)	49:4 Varia mucho el clima (2:2)	66:4 Ya no llueve normal. (2:2)
28:1 es el calor intenso que se sie.. (2:2)	49:5 a producción es menos o más va.. (2:2)	67:1 cambios muy bruscos de tempera.. (2:2)
28:2 es el calor intenso que se sie.. (2:2)	50:1 Son los cambios bruscos y repe.. (2:2)	67:2 cambios muy bruscos de tempera.. (2:2)
29:1 A raiz de la contaminación se .. (2:2)	50:2 Son los cambios bruscos y repe.. (2:2)	67:3 mucha lluvia y lluvias acidas (2:2)
29:2 A raiz de la contaminación se .. (2:2)	50:3 afectan la producción y la sal.. (2:2)	67:4 provocan peridas y enfermedade.. (2:2)
30:1 Es el cambio del clima respect.. (2:2)	51:1 De que se calienta la tierra ,.. (2:2)	68:1 las lluvias ya producen enferm.. (2:2)
30:2 Es el cambio del clima (2:2)	51:2 De que se calienta la tierra ,.. (2:2)	68:2 enfermedades en las plantas (2:2)
30:3 calores (2:2)	51:3 de repente llueve fuera de tie.. (2:2)	68:3 llueve exageradio y algunas ve.. (2:2)
30:4 quemas y talas forestales (2:2)	51:4 seuias prolongadas o lluvias e.. (2:2)	69:1 Que hay cambios bruscos de tem.. (2:2)

List of current quotations (183). Quotation-Filter: All	HU: Words to describe climate change Edited by: Super	
30:5 capa de ozono sea destruida y .. (2:2)	52:1 Cambio de la naturaleza. Cuand.. (2:2)	69:2 Que hay cambios bruscos de tem.. (2:2)
31:1 Son los resultados del mal man.. (2:2)	52:2 Cambio de la naturaleza. (2:2)	70:1 Las temperaturas varian mucho .. (2:2)
31:2 Son los resultados del mal man.. (2:3)	52:3 hay lluvias y calor excesivo (2:2)	70:2 Las temperaturas varian mucho .. (2:3)
31:3 contaminación atmosferica , (2:2)	53:1 que con el cambio llueve mas o.. (2:2)	70:3 Las temperaturas varian mucho (2:2)
31:4 mal manejo (2:2)	53:2 que con el cambio llueve mas o.. (2:2)	70:4 es muy variable el tiempo (2:2)
31:5 seuias intensivas lluvias exge.. (2:2)	53:3 hay enfermedades que antes no .. (2:2)	70:5 llueve mas o hay sequia (2:2)
32:1 Son los cambios bruscos que pr.. (2:2)	54:1 son las lluvias a destiempo , .. (2:2)	
32:2 Son los cambios bruscos que pr.. (2:2)	54:2 son las lluvias a destiempo , .. (2:3)	
33:1 Es el recalentamientoo globa q.. (2:2)	54:3 dicen los abuelos que antes no.. (2:2)	

Appendix 2: The Q-Methodology

Table 1 Statements for the concourse in Q-Methodology

CATEGORIES OF THE DISCOURSE	LEVEL	STAT. Nº	SPANISH STATEMENT	ORIGINAL ENGLISH STATEMENT
Behaviour, actions and climate change	Preventive	2	Debemos frenar el cambio climático para preservar los ecosistemas	We have to stop climate change to save natural ecosystems
	Preventive	12	No es justo dejar el problema del cambio climático para que lo resuelvan las generaciones futuras	It is unfair to leave climate change to be solved by future generations
	Preventive	13	Comprar productos locales es una buena forma de cuidar nuestro medioambiente	Buying local products is a good way to care about the environment
	Preventive	24	Cuando hablamos de cambio climático más vale prevenir que lamentar	When it comes to changing climate; I would rather be safe than sorry
	Local	25	Cuando compro cosas, pienso en la naturaleza y los costos que esos productos general en el medioambiente	When buying things I think of nature and the costs these products generated in the environment
	Preventive	30	Necesitamos tener industrias y petróleo para que nuestra economía funcione	We need industries and fossil fuels to keep our economy running
	Local	33	En mi comunidad a veces hacemos mal uso de los recursos naturales	In my community, we sometimes misuse natural resources
	Global	34	La tierra tiene muchos recursos naturales y el hombre debe usarlos libremente	The earth has plenty of natural resources if we just learn how to develop them
	Global	37	Si las personas de los países ricos hicieran más para ahorrar energía reduciríamos el cambio climático	If people in richer countries around the world would take action to save energy, we will reduce climate change a lot
	Global	41	Las empresas deberían usar nuevas tecnologías para ser más eficientes y detener el cambio climático	Industries should use new technology to become more efficient and help stop climate change
Concern and climate change	Responsibility	1	Me siento responsable por mi contribución al cambio climático	I feel guilty about my contribution to climate change
	Awareness	5	Para aumentar la conciencia sobre el cambio climático deberían llevarse a cabo más actividades y programas educativos	More educational programs are needed to increase public awareness about climate change
	Responsibility	6	Las personas no piensan en los efectos a largo plazo de sus actos sobre el medioambiente	People are not thinking about the long-term effects of what they do on the environment.
	Awareness	15	Las plantas y los animales tienen el mismo derecho que los hombres a existir	Plants and animals have as much right as humans to exist

	Awareness	20	Las personas no tienen que preocuparse por el cambio climático porque no podemos hacer nada para controlarlo	People do not need to feel more concerned about climate change issues as these are not under their control
	Awareness	28	Antes de hacer algo para detener el cambio climático es necesario demostrar que está causado por las personas	Before we do anything, it has to be proven that people cause climate change
	Responsibility	35	Todos somos responsables de los problemas medioambientales	We all have the responsibility for environmental problems
	Awareness	39	El cambio climático es un aspecto medioambiental muy importante	climate change is an important environmental issue
	Awareness	40	Estoy muy preocupado por el medioambiente	I am very concern about the environment
Impacts and climate change	Human	10	Las personas de los países industrializados no se verán afectadas por el cambio climático	People in modern industrialized countries will not be harm by climate change
	Human	11	Creo que el cambio climático traerá cosas buenas para mi comunidad	I think that climate change will bring good things to my community
	Environment	17	Hoy en día en mi territorio llueve mucho más y las lluvias son más fuertes que hace años	Nowadays, in my territory rains are much stronger, and it rains more than years ago
	Environment	23	Las tradiciones y la cultura de mi territorio no serían las mismas si cambiara el medioambiente	If the environment changed, culture and traditions would not be the same
	Human	26	Solo cuando las personas se vean afectadas por el cambio climático harán algo al respecto	Only when people feel affected by climate change will they act
	Environment	29	Si no actuamos ahora el cambio climático nos llevará al desastre	If we do not act now, climate change will lead us to disaster
	Environment	36	La naturaleza se adapta fácilmente y se recuperara de cualquier daño causado por las personas	Nature easily adapts and recover from any damage caused by people
Management and climate change	Local	38	El medio ambiente en mi comunidad ha cambiado bastante en los últimos años	The environment in my community has changed considerably over recent years
	Local	4	Nuestro municipio debería estar preparado para poder lidiar con los efectos del cambio climático	When it comes to climate change impacts here municipality should be prepared to deal with them
	National	8	Confío en lo que el gobierno dice sobre cambio climático	I trust what I hear about climate change from government
	National	16	El gobierno debería haber reaccionado antes para detener el cambio climático	The government should have stopped climate change from happening
	National	18	Pienso que el cambio climático debería ser una prioridad para nuestro gobierno	I think climate change should be a priority for our government
	National	21	El gobierno deberían asumir responsabilidad para legislar en temas medioambientales más de lo que lo hace ahora	The government should take responsibility for legislating on environmental issues a great deal more than it does
	National	27	Sólo el gobierno debe actuar para detener los efectos del cambio climático	We should wait for the government to act on climate change
Knowledge, information and climate change	Level	9	Necesito mucha más información sobre cambio climático	I feel I need more information about climate change
	Level	14	No hay suficiente información para afirmar que el cambio climático es real	There is not enough information to definitively say that climate change is real

	Level	22	En mi comunidad conocemos bien el entorno y sabemos cuándo la naturaleza no se comporta de forma normal	In my community, we know well the environment, and we know when nature does not behave normally
	Sources	3	Los medios de comunicación no comunican bien los efectos del cambio climático	The media does a poor job at conveying the effect of climate change to the public
	Sources	7	Es difícil confiar en lo que los medios de comunicación publican sobre cambio climático	It is difficult to trust what comes out in the media on the issue of climate change
	Sources	19	Existe desacuerdo entre los científicos sobre si el cambio climático está ocurriendo o no	There are lots of disagreement among scientist about whether or not climate change is happening
	Sources	31	Las organizaciones medioambientales asustan al público con sus mensajes sobre cambio climático	Environmental organizations scare the public with talk of climate change
	Sources	32	Confío en lo que los científicos dicen sobre cambio climático	I trust what scientist say about climate change

Table 2 Coefficients and critical values for Q-Methodology

		P<	**Coefficient (Z score)**	**Critical value**	**Significant factor loading**
		0,001	3,29	0,514063	0,4935
		0,01	2,58	0,403125	0,387
		0,05	1,96	0,30625	0,294
STATEMENTS	41				
SQRT	6,4				
SE_r	0,15				

Table 3: Consejos Comunitarios matrix between q-sorts

Consejos Comunitarios Correlation matrix between sorts																								
SORTS		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
1	1	100	53	47	37	20	56	23	47	35	46	47	58	32	53	31	42	50	54	39	58	7	58	38
2	2	53	100	52	36	32	58	45	34	14	35	35	55	31	42	28	49	48	45	15	42	24	64	45
3	3	47	52	100	51	39	51	21	30	-5	38	35	49	27	23	27	34	62	48	34	45	12	58	39
4	4	37	36	51	100	32	27	-8	30	-13	14	9	26	25	6	28	19	24	22	22	31	-11	28	9
5	5	20	32	39	32	100	51	38	46	-1	21	16	20	25	13	26	22	40	47	-13	43	12	43	29
6	6	56	58	51	27	51	100	54	38	35	49	66	72	26	34	43	50	34	55	28	69	34	78	57
7	7	23	45	21	-8	38	54	100	31	11	34	45	38	36	44	9	36	46	43	5	31	9	57	52
8	8	47	34	30	30	46	38	31	100	6	23	29	26	39	39	19	34	39	52	-6	55	19	29	41
9	9	35	14	-5	-13	-1	35	11	6	100	31	26	35	5	14	46	33	11	25	27	28	22	45	18
10	10	46	35	38	14	21	49	34	23	31	100	39	27	33	58	18	35	66	51	28	48	-3	59	49
11	11	47	35	35	9	16	66	45	29	26	39	100	49	32	37	27	44	27	38	21	38	31	49	38
12	12	58	55	49	26	20	72	38	26	35	27	49	100	34	35	38	52	32	46	46	69	36	61	50
13	13	32	31	27	25	25	26	36	39	5	33	32	34	100	47	25	38	45	49	25	31	19	26	22
14	14	53	42	23	6	13	34	44	39	14	58	37	35	47	100	-1	39	56	47	10	48	5	41	45
15	15	31	28	27	28	26	43	9	19	46	18	27	38	25	-1	100	32	13	25	34	36	30	34	15
16	2011	42	49	34	19	22	50	36	34	33	35	44	52	38	39	32	100	36	33	17	56	25	48	45
17	17	50	48	62	24	40	34	46	39	11	66	27	32	45	56	13	36	100	63	24	36	6	58	50
18	18	54	45	48	22	47	55	43	52	25	51	38	46	49	47	25	33	63	100	23	64	15	61	58
19	19	39	15	34	22	-13	28	5	-6	27	28	21	46	25	10	34	17	24	23	100	15	20	26	9
20	20	58	42	45	31	43	69	31	55	28	48	38	69	31	48	36	56	36	64	15	100	18	60	66

21	21		7	24	12	-11	12	34	9	19	22	-3	31	36	19	5	30	25	6	15	20	18	100	23	18
22	22		58	64	58	28	43	78	57	29	45	59	49	61	26	41	34	48	58	61	26	60	23	100	57
23	23		38	45	39	9	29	57	52	41	18	49	38	50	22	45	15	45	50	58	9	66	18	57	100

Table 4 Santiago Comaltepec Correlation matrix between q- sorts

SORTS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	1	100	62	63	39	69	62	44	63	42	43	36	9	58	26	61	63	61	61	19	54	4
2	2	62	100	56	45	64	44	53	57	42	42	44	36	42	18	65	62	45	61	36	66	0
3	3	63	56	100	26	63	36	42	44	49	52	38	11	49	4	55	56	43	50	-2	47	-6
4	30	39	45	26	100	41	52	41	35	34	32	23	42	28	22	26	61	40	44	34	47	18
5	36	69	64	63	41	100	58	64	46	30	62	45	25	48	34	50	65	57	54	28	48	4
6	6	62	44	36	52	58	100	48	30	36	59	48	19	34	38	26	61	55	63	26	48	16
7		44	53	42	41	64	48	100	45	41	47	54	42	43	48	51	71	51	55	29	62	-6
8		63	57	44	35	46	30	45	100	29	41	48	30	59	15	64	57	56	55	41	65	11
9		42	42	49	34	30	36	41	29	100	44	23	34	39	14	45	55	55	56	8	54	-8
10		43	42	52	32	62	59	47	41	44	100	39	20	32	17	35	51	53	48	15	52	9
11		36	44	38	23	45	48	54	48	23	39	100	30	53	31	42	51	53	53	39	50	15
12		9	36	11	42	25	19	42	30	34	20	30	100	20	34	25	40	37	40	28	46	11
13		58	42	49	28	48	34	43	59	39	32	53	20	100	15	67	57	48	60	15	59	1
14	33	26	18	4	22	34	38	48	15	14	17	31	34	15	100	26	33	45	42	25	45	-21
15		61	65	55	26	50	26	51	64	45	35	42	25	67	26	100	49	52	65	31	67	0
16		63	62	56	61	65	61	71	57	55	51	51	40	57	33	49	100	72	56	25	74	-4
17	10	61	45	43	40	57	55	51	56	55	53	53	37	48	45	52	72	100	56	29	66	1
18	34	61	61	50	44	54	63	55	55	56	48	53	40	60	42	65	56	56	100	41	65	1
19		19	36	-2	34	28	26	29	41	8	15	39	28	15	25	31	25	29	41	100	32	18
20		54	66	47	47	48	48	62	65	54	52	50	46	59	45	67	74	66	65	32	100	-3
21		4	0	-6	18	4	16	-6	11	-8	9	15	11	1	-21	0	-4	1	1	18	-3	100

Table 5 Consejos Comunitatios Unrotated factor Matrix

Consejos Comuntiarios: Unrotated factors Matrix									
		Factors							
		1	2	3	4	5	6	7	8
SORTS									
1 1		0.7380	0.0757	0.1242	0.2795	0.0398	0.2094	-0.2441	-0.0469
2 2		0.7064	-0.0454	0.1162	-0.0605	-0.0871	-0.2554	-0.1479	-0.1980
3 3		0.6575	-0.1141	0.4714	0.1140	-0.1903	-0.2699	0.0203	0.1566
4 4		0.3718	-0.1120	0.7871	0.0754	-0.0012	0.0577	-0.1413	-0.1968
5 5		0.4987	-0.3247	0.2542	-0.5163	-0.1120	0.0819	0.3683	-0.0477
6 6		0.8335	0.2104	-0.0200	-0.2462	-0.2343	-0.0777	-0.0393	-0.0575
7 7		0.5861	-0.2242	-0.4220	-0.1865	-0.0967	-0.3205	0.1648	-0.2443
8 8		0.5675	-0.3169	0.0963	-0.3159	0.3669	0.3141	-0.1036	0.1001
9 9		0.3665	0.5939	-0.3169	0.0956	-0.0900	0.4448	0.2201	-0.0970
10 10		0.6523	-0.1611	-0.2224	0.4217	-0.1746	0.1517	0.1937	-0.0049
11 11		0.6237	0.2062	-0.2207	-0.0617	0.0616	-0.2304	-0.1185	-0.2172
12 12		0.7487	0.3641	0.0487	-0.0259	-0.0100	-0.1538	-0.2771	0.1136
13 13		0.5269	-0.1636	0.0245	0.1321	0.6560	-0.1211	0.2107	-0.1681
14 14		0.6098	-0.3237	-0.3586	0.3032	0.2428	0.0594	-0.1944	-0.0619
15 15		0.4446	0.5273	0.2774	-0.1324	0.1011	0.2319	0.3388	-0.1855
16 20	11	0.6510	0.1480	-0.1067	-0.0844	0.1528	0.0261	-0.2442	-0.2641
17 17		0.6955	-0.3992	-0.0033	0.3070	-0.0071	-0.0931	0.2892	0.1107
18 18		0.7674	-0.2105	-0.0166	0.0177	0.0675	0.1505	0.2018	0.2605
19 19		0.3547	0.4843	0.2174	0.5383	0.0968	-0.2108	0.1314	0.2014
20 20		0.7882	0.0085	0.0272	-0.1667	-0.0357	0.3364	-0.2582	0.1900
21 21		0.2964	0.4588	-0.1071	-0.3834	0.3640	-0.3110	0.1029	0.3641
22 22		0.8393	0.0778	-0.0579	-0.0012	-0.3500	-0.0532	0.1246	-0.0590
23 23		0.6996	-0.1586	-0.2609	-0.1145	-0.1887	0.0223	-0.1556	0.3091
Eigen values		91.047	19.989	16.728	14.600	11.279	10.586	0.9689	0.7739
% expl. Variance		40	9	7	6	5	5	4	3

Table 6 Distinguished statements for Consejos Comunitarios Perception 1

	Consejos Comunitarios 1		**Factors**					
				1		**2**		**3**
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
S29	If we don't act now, climate change will lead us to disaster	29	4	1.66*	2	0.99	-1	-0.67
S24	When it comes to changing climate; I´d rather be safe than sorry	24	4	1.53*	-2	-1.01	1	0.57
S37	If people in richer countries around the world would take action to save energy, we will reduce climate change a lot	37	2	0.91	-2	-0.88	0	0.11
S38	The environment in my community has changed considerably over recent years	38	1	0.79*	0	-0.24	-2	-0.89
S22	In my community, we know well the environment, and we know when nature does not behave normally	22	1	0.78*	-1	-0.65	-1	-0.51
S15	Plants and animals have as much right as humans to exist	15	1	0.75*	3	1.59	-1	-0.58
S32	I trust what scientist say about climate change	32	1	0.49*	-4	-1.80	-2	-1.02
S4	When it comes to climate change impacts here municipality should be prepared to deal with them	4	0	0.38	0	-0.25	2	1.31
S1	I feel guilty about my contribution to climate change	1	0	0.35	0	-0.23	2	1.31
S9	I feel I need more information about climate change	9	0	0.14	1	0.75	2	0.78
S39	Climate change is an important environmental issue	39	0	-0,09	2	0,8	2	0,91
S17	Nowadays, in my territory rains are much stronger and it rains more than years ago	17	0	-0,36	-4	-1,92	0	0,29
S41	Industries should use new technology to become more efficient and help stop climate change	41	-1	-0,49	1	0,5	4	1,73
S26	Only when people feel affected by climate change will they act	26	-2	-1,15	-1	-0,48	0	-0,07

Table 7: Distinguished statements for Consejos Comunitarios Perception 2

	Consejos Comunitarios 2			**Factors**				
				1		**2**		**3**
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
S6	People are not thinking about the long-term effects of what they do on the environment.	6	0	-0.01	4	1.88*	-1	-0.49
S40	I am very concern about the environment	40	2	1.09	4	1.79*	2	0.67
S15	Plants and animals have as much right as humans to exist	15	1	0.75	3	1.59*	-1	-0.58
S29	If we don't act now, climate change will lead us to disaster	29	4	1.66	2	0.99*	-1	-0.67
S34	The earth has plenty of natural resources if we just learn how to develop them	34	-3	-1.43	1	0.54*	-2	-1.15
S41	Industries should use new technology to become more efficient and help stop climate change	41	-1	-0.49	1	0.50*	4	1.73
S3	The media does a poor job at conveying the effect of climate change to the public	3	-1	-0.44	0	0.44*	-2	-0.93
S14	There is not enough information to definitively say that climate change is real	14	-2	-1.00	0	0.32*	-3	-1.24
S11	I think that climate change will bring good things to my community	11	-4	-1.71	0	0.16*	-3	-1.24
S1	I feel guilty about my contribution to climate change	1	0	0.35	0	-0.23	2	1.31
S4	When it comes to climate change impacts here municipality should be prepared to deal with them	4	0	0.38	0	-0.25	2	1.31
S20	People do not need to feel more concerned about climate change issues as these are not under their control	20	-4	-1.70	-1	-0.88*	-4	-2.24
S37	If people in richer countries around the world would take action to save energy, we will reduce climate change a lot	37	2	0.91	-2	-0.88*	0	0.11
S24	When it comes to changing climate; I´d rather be safe than sorry	24	4	1.53	-2	-1.01*	1	0.57
S25	When buying things I think of nature and the costs these products generated in the environment	25	0	0.18	-3	-1.25*	0	-0.24
S32	I trust what scientist say about climate change	32	1	0.49	-4	-1.80	-2	-1.02
S17	Nowadays, in my territory rains are much stronger and it rains more than years ago	17	0	-0.36	-4	-1.92*	0	0.29

Table 8 Distinguished statements for Consejos Comunitarios Perception 3

	Consejos Comunitarios 3		**Factors**					
				1		**2**		**3**
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
S41	Industries should use new technology to become more efficient and help stop climate change	41	-1	-0.49	1	0.50	4	1.73*
S13	Buying local products is a good way to care about the environment	13	0	0.01	0	0.37	3	1.60*
S4	When it comes to climate change impacts here municipality should be prepared to deal with them	4	0	0.38	0	-0.25	2	1.31*
S1	I feel guilty about my contribution to climate change	1	0	0.35	0	-0.23	2	1.31*
S24	When it comes to changing climate; I´d rather be safe than sorry	24	4	1.53	-2	-1.01	1	0.57*
S19	There is lots of disagreement among scientist about whether or not climate change is happening	19	-2	-0.83	-1	-0.78	1	0.52*
S28	Before we do anything, it has to be proven that people cause climate change	28	-1	-0.72	-1	-0.67	1	0.45*
S30	We need industries and fossil fuels to keep our economy running	30	-3	-1.53	-2	-1.05	1	0.33*
S17	Nowadays, in my territory rains are much stronger and it rains more than years ago	17	0	-0.36	-4	-1.92	0	0.29
S18	I think climate change should be a priority for our government	18	2	1.03	2	1.06	0	0.28
S37	If people in richer countries around the world would take action to save energy, we will reduce climate change a lot	37	2	0.91	-2	-0.88	0	0.11
S2	We have to stop climate change to save natural ecosystems	2	3	1.30	2	0.83	0	0.08
S36	Nature easily adapts and recover from any damage caused by people	36	-3	-1.67	-3	-1.58	0	0.02*
S23	If the environment changed, culture and traditions wouldn't be the same	23	2	1.02	1	0.60	-1	-0.49*
S15	Plants and animals have as much right as humans to exist	15	1	0.75	3	1.59	-1	-0.58*
S29	If we don't act now, climate change will lead us to disaster	29	4	1.66	2	0.99	-1	-0.67*
S32	I trust what scientist say about climate change	32	1	0.49	-4	-1.80	-2	-1.02
S16	The government should have stopped climate change from happening	16	0	0.47	1	0.75	-3	-1.18*

Table 9: Santiago Comaltepec unrotated factor Matrix

Santiago Comaltepec Unrotated factor Matrix									
		Factors							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
SORTS									
1 1		0.7730	-0.3171	0.1191	0.0875	-0.1713	-0.2173	-0.2519	-0.1050
2 2		0.7676	-0.0756	0.1076	-0.1132	0.1021	-0.3564	0.2073	0.1475
3 3		0.6645	-0.5444	0.0247	0.1115	0.0596	-0.0172	0.2185	0.0581
4 30	27	0.5809	0.3284	0.1152	0.2809	0.3369	-0.3546	-0.1342	-0.2526
5 36	28	0.7740	-0.1098	0.0355	0.2438	-0.2524	-0.1790	0.2845	-0.0376
6 6		0.6887	0.1387	0.0463	0.5307	-0.2051	0.0068	-0.2485	0.0478
7		0.7488	0.1632	-0.2267	0.0139	-0.0853	0.0297	0.3448	-0.1006
8		0.7238	-0.0581	0.2904	-0.3501	-0.0177	-0.0412	-0.0183	-0.1184
9		0.6081	-0.1912	-0.2295	0.0754	0.4989	0.1873	-0.2177	0.3002
10		0.6509	-0.1273	0.0476	0.4200	-0.0253	0.2084	0.2045	0.2864
11		0.6520	0.1747	0.1573	-0.1174	-0.3122	0.4128	0.1719	-0.0384
12		0.4612	0.5229	-0.1429	-0.1349	0.4654	0.1195	0.2456	-0.0506
13		0.6905	-0.2729	0.1082	-0.3188	-0.0469	0.2155	-0.1592	-0.2803
14 33	3	0.4372	0.4403	-0.5550	-0.0218	-0.3583	0.0108	-0.1461	-0.0376
15		0.7405	-0.2234	0.0702	-0.4412	0.0033	-0.0448	-0.0459	0.1002
16		0.8526	0.0037	-0.1140	0.1410	0.1252	-0.0458	0.0376	-0.2762
17 10	30	0.7826	0.0600	-0.1312	0.0700	-0.0237	0.2105	-0.1927	-0.0525
18 34	11	0.8167	0.0538	-0.0262	-0.0909	-0.0215	0.0292	-0.2197	0.2689
19		0.4098	0.5509	0.3086	-0.2652	-0.1903	-0.2473	-0.0368	0.3481
20		0.8401	0.0677	-0.1296	-0.1840	0.1459	0.0556	-0.0344	-0.0410
21		0.0427	0.2795	0.7886	0.2143	0.1254	0.2636	-0.0374	-0.0667
Eigen values		96.530	16.395	13.683	12.696	10.543	0.8277	0.7528	0.6726
% expl. Variance		46	8	7	6	5	4	4	3

Table 10: Distinguished statements for Santiago Comaltepec Perception 1

			Factors					
				1		2		3
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
S12	It is unfair to leave climate change to be solved by future generations	12	4	1.67*	0	0.22	-2	-1.03
S6	People are not thinking about the long-term effects of what they do on the environment.	6	4	1.42*	1	0.65	-4	-2.33
S5	More educational programs are needed to increase public awareness about climate change	5	3	1.39*	0	-0.16	0	0.43
S39	Climate change is an important environmental issue	39	3	1.28	1	0.64	0	0.00
S26	Only when people feel affected by climate change will they act	26	2	0.74*	-4	-1.86	-3	-1.16
S18	I think climate change should be a priority for our government	18	1	0.56	0	-0.23	3	1.31
S37	If people in richer countries around the world would take action to save energy, we will reduce climate change a lot	37	1	0.46	2	1.02	-3	-1.46
S21	The government should take responsibility for legislating on environmental issues a great deal more than it does	21	0	0.42	2	1.10	-1	-0.87
S33	In my community, we sometimes misuse natural resources	33	0	0.30*	-2	-0.95	4	1.90
S3	The media does a poor job at conveying the effect of climate change to the public	3	0	0.21*	-3	-1.64	4	1.47
S23	If the environment changed, culture and traditions wouldn't be the same	23	-1	-0.11	-1	-0.71	3	1.46
S19	There is lots of disagreement among scientist about whether or not climate change is happening	19	-1	-0.24	-2	-1.04	-2	-1.02
S27	We should wait for the government to act on climate change	27	-3	-1.48*	-1	-0.50	-1	-0.44
S36	Nature easily adapts and recover from any damage caused by people	36	-4	-1.98*	-1	-0.49	-2	-1.01
S34	The earth has plenty of natural resources if we just learn how to develop them	34	-4	-2.23*	0	-0.09	-1	-0.15

Table 11: Distinguished statements for Santiago Comaltepec Perception 2

		Factors						
				1		2		3
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
S15	Plants and animals have as much right as humans to exist	15	2	1.17	4	1.92	2	1.01
S13	Buying local products is a good way to care about the environment	35	2	1.03	4	1.77*	0	0.43
S13	Buying local products is a good way to care about the environment	13	-1	-0.16	3	1.40*	0	0.29
S21	The government should take responsibility for legislating on environmental issues a great deal more than it does	21	0	0.42	2	1.10	-1	-0.87
S37	If people in richer countries around the world would take action to save energy, we will reduce climate change a lot	37	1	0.46	2	1.02	-3	-1.46
S6	People are not thinking about the long-term effects of what they do on the environment.	6	4	1.42	1	0.65*	-4	-2.33
S12	It is unfair to leave climate change to be solved by future generations	12	4	1.67	0	0.22*	-2	-1.03
S18	I think climate change should be a priority for our government	18	1	0.56	0	-0.23*	3	1.31
S9	I feel I need more information about climate change	9	0	0.18	-1	-0.40	1	0.72
S31	Environmental organizations scare the public with talk of climate change	31	-2	-1.00	-1	-0.41	-3	-1.31
S23	If the environment changed, culture and traditions wouldn't be the same	23	-1	-0.11	-1	-0.71	3	1.46
S33	In my community, we sometimes misuse natural resources	33	0	0.30	-2	-0.95*	4	1.90
S3	The media does a poor job at conveying the effect of climate change to the public	3	0	0.21	-3	-1.64*	4	1.47

Table 12: Distinguished statements for Comaltepec Perception 3

		Factors						
				1		2		3
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
S33	In my community, we sometimes misuse natural resources	33	0	0.30	-2	-0.95	4	1.90*
S3	The media does a poor job at conveying the effect of climate change to the public	3	0	0.21	-3	-1.64	4	1.47*
S23	If the environment changed, culture and traditions wouldn't be the same	23	-1	-0.11	-1	-0.71	3	1.46*
S10	People in modern industrialized countries won't be harm by climate change	10	-2	-1.44	-4	-1.65	3	1.31*
S18	I think climate change should be a priority for our government	18	1	0.56	0	-0.23	3	1.31
S11	I think that climate change will bring good things to my community	11	-3	-1.75	-3	-1.37	2	0.73*
S7	It is difficult to trust what comes out in the media on the issue of climate change	7	0	0.02	-1	-0.37	2	0.73
S8	I trust what I hear about climate change from government	8	-2	-1.01	-2	-1.13	1	0.59*
S2	We have to stop climate change to save natural ecosystems	2	3	1.37	3	1.40	0	0.44
S21	The government should take responsibility for legislating on environmental issues a great deal more than it does	21	0	0.42	2	1.10	-1	-0.87*
S17	Nowadays, in my territory rains are much stronger and it rains more than years ago	17	0	-0.04	0	-0.20	-2	-1.02
S12	It is unfair to leave climate change to be solved by future generations	12	4	1.67	0	0.22	-2	-1.03*
S37	If people in richer countries around the world would take action to save energy, we will reduce climate change a lot	37	1	0.46	2	1.02	-3	-1.46*
S14	There is not enough information to definitively say that climate change is real	14	-2	-0.67	-2	-1.02	-4	-2.04
S6	People are not thinking about the long-term effects of what they do on the environment.	6	4	1.42	1	0.65	-4	-2.33*

Appendix 3: The questionnaire

Buenas tardes. Esta encuesta forma parte de un estudio sobre el cambio climático. Esta investigación se realiza por la Universidad de Córdoba (España) en colaboración con otras Universidades e Institutos de investigación dentro del proyecto COMET-LA, como la Universidad Nacional Autónoma de México (UNAM) y Estudios Rurales y Asesoría (ERA)

La confidencialidad de la información y el anonimato de la misma están asegurados cumpliendo con los principios éticos establecidos en el Proyecto COMET-LA.

Completar la encuesta no le tomará más de 30 minutos. Si en algún momento no sabe qué responder o desea no contestar, tendrá la oportunidad de hacerlo marcando la casilla No sabe / No contesta

Si se equivoca simplemente escriba un NO junto a la respuesta equivocada y vuelva a señalar aquella que considere más adecuada.

Le agradecemos su colaboración y su tiempo.

Por favor, indique el municipio en que se encuentra en el momento de completar esta encuesta:

_____

Para comenzar le vamos a pedir que complete alguna información sobre usted. Recuerde que la encuesta es totalmente anónima y la información que nos facilite no conducirá en ningún momento a su identificación ni dañará de forma alguna su intimidad.

1. ¿Es usted hombre o mujer?

Hombre ○ Mujer ○

2. ¿Qué edad tiene? ☐

3. Último grado académico completado

Educación primaria	Educación secundaria	Educación Media Superior	Educación Superior
○	○	○	○

4. ¿En qué localidad reside?

5. ¿Cuántos años lleva residiendo en dicha localidad?

6. Según su criterio, vive usted en...

Área urbana	Área rural
○	○

7. ¿Su trabajo depende de los recursos naturales?

Si ○ No ○

8. En caso de que haya dicho que SI ¿Podría explicar en qué consiste su trabajo?(por ejemplo es usted pesca, trabaja con la madera, cultiva, etc.)

_____

9. ¿Dispone de vehículo motorizado privado? (automóvil, motocicleta, etc.)

Si ○ No ○

Con las siguientes preguntas nos interesaría conocer su opinión sobre su relación con la naturaleza.

10. ¿Qué tan preocupado está usted por el hecho de que en su territorio se estén agotando los recursos naturales?

Muy preocupado	Preocupado	Ligeramente preocupado	Nada preocupado
○	○	○	○

11. ¿Está de acuerdo o en desacuerdo con estas afirmaciones?

	Nada de acuerdo	Poco de acuerdo	De acuerdo	Muy de acuerdo	No sabe/No contesta
Las personas tienen el derecho de modificar el medioambiente para responder a sus necesidades	○	○	○	○	○
Cuando los seres humanos interfieren en la naturaleza a menudo se producen consecuencias desastrosas	○	○	○	○	○
Los seres humanos abusan de la naturaleza	○	○	○	○	○
La naturaleza puede soportar el impacto de la actividad de las industrias	○	○	○	○	○
Los seres humanos fueron creados para gobernar sobre el resto de la naturaleza	○	○	○	○	○
Si las cosas continúan como hasta ahora, pronto experimentaremos una catástrofe ecológica	○	○	○	○	○
La naturaleza se adapta fácilmente y se recuperará de cualquier daño causado por las personas	○	○	○	○	○
En la tierra viven más personas de las que deberían vivir	○	○	○	○	○
El ser humano puede garantizar que la tierra sea un lugar habitable	○	○	○	○	○
La tierra tiene muchos recursos naturales y el hombre debe usarlos libremente	○	○	○	○	○
Las plantas y los animales tiene el mismo derecho que los hombres a existir	○	○	○	○	○
El ser humano está sometido de las leyes de la naturaleza	○	○	○	○	○
La Tierra no recursos muy limitados para todos los seres humanos	○	○	○	○	○
En el futuro el ser humano aprenderá sobre la naturaleza y la dominará	○	○	○	○	○

12. Señale , como en pregunta anterior, si está de acuerdo o en desacuerdo con las siguientes afirmaciones

	Nada de acuerdo	Poco de acuerdo	De acuerdo	Muy de acuerdo	No sabe/No contesta
En un sistema justo la gente más formada debería ganar más	○	○	○	○	○
En este país las personas más capacitadas deberían poder acceder a los puestos más altos	○	○	○	○	○
Es justo que quienes se esfuerzan más sean tengan más éxito en la vida	○	○	○	○	○
Las ayudas del Estado paralizan la iniciativa individual	○	○	○	○	○
Si una persona tiene la energía y ambición necesaria para enriquecerse, debería tener derecho a hacerlo	○	○	○	○	○
Pienso que debería haber más disciplina entre los jóvenes de hoy en día	○	○	○	○	○
Soy mucho más estricto que la mayoría de las personas cuando pienso en lo que está bien o mal	○	○	○	○	○
Valoro fuertemente las rutinas	○	○	○	○	○
Ser puntual es muy importante	○	○	○	○	○
Las personas deberían ser recompensadas según su posición en la sociedad	○	○	○	○	○
Pocas veces cooperar con otras personas de mi comunidad es positivo	○	○	○	○	○
La gente a menudo me trata de forma injusta	○	○	○	○	○

13. Por favor valore las siguientes afirmaciones

	Nada de acuerdo	Poco de acuerdo	De acuerdo	Muy de acuerdo	No sabe/No contesta
Creo que ser desconfiado es la mejor actitud para relacionarme con la gente	○	○	○	○	○
No le presto demasiada atención a la política porque no tengo mucha influencia sobre las cosas	○	○	○	○	○
No merece la pena hacer cosas por los demás	○	○	○	○	○
El futuro es demasiado incierto como para hacer planes	○	○	○	○	○
Si las personas en este país fueran tratadas de forma más equitativa tendríamos menos problemas	○	○	○	○	○
Aquellos que prosperan deberían pagar más impuestos para apoyar a los más desfavorecidos	○	○	○	○	○
La diferencia entre países ricos y pobres es injusta	○	○	○	○	○
El racismo es un problema serio en nuestra sociedad	○	○	○	○	○
México necesita un cambio radical para distribuir los bienes de forma más justa	○	○	○	○	○
El gobierno debería asegurar que todos los ciudadanos tengan un buen nivel de vida	○	○	○	○	○

14. Cuando compra cosas ¿piensa en el impacto sobre el medioambiente que tiene lo que compra?

Si ○ No ○ No sabe/No contesta ○

15. ¿Cree que las autoridades le ayudan a tener un comportamiento que mantenga la naturaleza en buenas condiciones?

Si ○ No ○ No es tarea de las autoridades encargarse de eso ○ No sabe/ No contesta ○

16. Actualmente ¿alguien en su hogar pertenece a un grupo u organización medioambiental?

Si ○ No ○ No sabe/No contesta ○

17. ¿Qué es para usted más importante proteger la naturaleza aunque se pierdan empleos o tener más empleos aunque se dañe la naturaleza? Señale solo UNA opción

Proteger la naturaleza ○ Tener más empleos ○ Un balance de las dos cosas ○ Depende de la situación económica del país ○ No sabe/ No contesta ○

18. Que usted recuerde en los últimos años ¿Cree que la naturaleza ha cambiado de alguna forma? (¿llueve más o menos que antes?, ¿hace más o menos calor? ¿hay más tormentas que antes? ¿hay más o menos animales?)

28. Para cada lugar señale cuando cree que los efectos del cambio climático comenzarán a sentirse en

	Actualmente	En 10 años	En 25 años	En 50 años	En 100 años
Su comunidad	○	○	○	○	○
Sierra de Oaxaca	○	○	○	○	○
México	○	○	○	○	○
A nivel mundial	○	○	○	○	○

En último lugar, usted contestará algunas preguntas también relacionadas con el cambio climático. Recuerde que la encuesta es totalmente anónima.

29.A nivel de cambio climático usted está

Desinformado	No muy informado	Bien informado	Muy bien informado
○	○	○	○

30. ¿Cree que necesitaría o no necesitaría más información sobre cambio climático?

No necesito más información	Necesitaría más información	Nunca he sentido necesidad de informarme
○	○	○

31. Si tuviera la oportunidad de hablar con un experto en cambio climático, ¿qué le gustaría preguntarle? Señale únicamente UNA opción

¿Qué es el cambio climático?	
¿Quién o qué causa el cambio climático?	○
¿Cómo tiene la certeza de que el cambio climático está ocurriendo?	○
¿Qué daño causará el cambio climático?	○
¿Dónde afectará el cambio climático?	○
¿El cambio climático dañará a las personas?	○
¿Cuándo comenzará el cambio climático a dañar a las personas?	○

32. ¿Cómo se informa del cambio climático?

Medio de comunicación (TV, radio, prensa escrita)	○
Internet	○
Organizaciones medioambientales	○
Personas de su entorno	○
No me interesa informarme	○

33.Para hablar de cambio climático ¿cuánta confianza le da...?

	Ninguna confianza	Poca confianza	Bastante confianza	Mucha confianza	No sabe/No contesta
Pronóstico del tiempo	○	○	○	○	○
TV, periódicos, radio	○	○	○	○	○
Científicos	○	○	○	○	○
Organizaciones medioambientales	○	○	○	○	○
Municipio	○	○	○	○	○
Secretaría de Salud	○	○	○	○	○
El Presidente	○	○	○	○	○

34. ¿Qué se acerca más a su manera de pensar? Si quiere puede elegir más de una opción

La mayor parte de los científicos piensan que el cambio climático está ocurriendo	○
La mayor parte de los científicos piensan que el cambio climático no está ocurriendo	○
Existe desacuerdo entre los científicos sobre las consecuencias del cambio climático	○
Existe desacuerdo entre los científicos sobre las causas del cambio climático	○
No tengo la suficiente información para contestar	○

35. ¿Cómo son sus sentimientos hacia las Instituciones de México?

Muy negativos	Negativos	Positivos	Muy positivos	No sabe/No contesta
○	○	○	○	○

36. ¿Cuál es su ideología política?

Izquierda	Centro izquierda	Centro derecha	Derecha
○	○	○	○

37. ¿Cree que el gobierno mexicano está haciendo lo correcto?

Nunca	Rara vez	Algunas veces	A menudo	Siempre	No sabe/No contesta
○	○	○	○	○	○

Muchas gracias por su colaboración, su ayuda es muy importante. Este cuestionario forma parte de una tesis doctoral dentro del proyecto COMET-LA, por lo que los resultados estarán disponibles en la web www.comet-la.eu . Si lo desea puede además dejar su correo electrónico y se los enviaremos personalmente.

Appendix 4: Identifying the influence of cultural theory on perceiving climate change

Table1 Correlations between cultural theory scales for joint databases

Correlations					
		(1)	(2)	(3)	(4)
INDIVIDUALISM (1)	Correlation Coefficient	1,000			
HIERARCHY (2)	Correlation Coefficient	,426**	1,000		
FATALISM (3)	Correlation Coefficient	,117	,245*	1,000	
EGALITARIANISM (4)	Correlation Coefficient	-,079	-,105	,088	1,000
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Table2 Correlations between cultural theory scales Santiago Comaltepec

Correlations					
		(1)	(2)	(3)	(4)
INDIVIDUALISM (1)	Correlation Coefficient	1,000			
HIERARCHY (2)	Correlation Coefficient	,097	1,000		
FATALISM (3)	Correlation Coefficient	-,015	-,229	1,000	
EGALITARIANISM (4)	Correlation Coefficient	,219	,124	,114	1,000

Table 3 Correlations between cultural theory scales Consejos Comunitarios

Correlations					
		(1)	(2)	(3)	(4)
INDIVIDUALISM (1)	Correlation Coefficient	1,000			
HIERARCHY (2)	Correlation Coefficient	,330*	1,000		
FATALISM (3)	Correlation Coefficient	,071	,241	1,000	
EGALITARIANISM (4)	Correlation Coefficient	,080	,364*	,514**	1,000
*. Correlation is significant at the 0.05 level (2-tailed).					
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 4 Individual scores on cultural theory scales

	Individualista	Jerarquico	Fatalista	Igualitario
Interview				
1	2,20	3,00	2,00	3,00
2	2,60	2,80	1,67	3,33
3	3,00	2,60	2,00	3,50
4	3,00	3,00	1,50	3,33
5	2,90	3,40	1,33	3,17
6	3,50	3,60	1,98	3,33
7	2,60	3,60	2,50	3,50
8	2,60	3,40	1,50	3,50
9	3,00	3,40	3,17	4,00
10	2,60	3,20	1,67	3,17
11	3,00	3,00	2,17	3,00
12	3,60	3,40	2,50	3,83
13	3,20	3,40	1,00	3,00
14	2,60	3,20	1,50	3,00
15	2,20	3,20	2,00	3,33
16	3,20	3,40	1,00	3,00
17	2,60	3,20	3,67	3,67
18	2,60	3,40	1,50	3,67
19	2,00	2,60	2,83	3,50
20	2,80	3,60	2,83	3,50
22	2,60	3,00	1,67	3,00
23	2,30	2,74	1,33	2,67
24	2,60	2,60	1,67	3,00
25	2,80	3,40	1,17	3,50
26	3,00	3,40	1,67	3,00
27	2,80	3,20	2,33	3,50
28	3,00	3,40	2,17	3,17
29	2,60	3,20	2,00	3,17
30	3,00	2,80	1,33	3,00
31	2,40	2,60	1,00	3,00
32	2,38	2,80	2,33	3,17
33	2,20	3,20	2,00	3,67
34	2,60	3,00	1,17	3,00
35	2,80	3,40	2,17	2,83
36	2,20	2,80	1,17	2,83
37	2,60	3,00	1,00	3,00
38	2,80	3,20	2,67	3,00
39	3,00	3,40	2,67	3,17
40	3,00	3,20	2,17	3,50
41	2,20	2,60	3,00	4,00

	Individualista	Jerarquico	Fatalista	Igualitario
42	2,60	1,60	1,17	3,00
43	3,20	2,80	1,17	3,50
44	2,40	2,80	1,50	3,67
45	2,60	2,60	1,83	3,00
46	2,20	3,00	1,33	3,67
47	2,40	2,60	1,33	3,50
48	2,80	3,20	1,67	3,83
49	2,40	2,60	2,33	3,50
50	2,60	2,00	1,50	3,83
51	2,80	2,40	1,50	3,83
52	2,40	2,40	1,83	4,00
53	2,65	2,81	1,67	3,50
54	2,80	2,80	1,00	4,00
55	2,60	3,40	1,17	4,00
56	2,40	2,80	1,17	3,50
57	2,72	2,78	1,58	3,74
58	2,26	3,34	1,41	3,57
59	2,33	2,78	1,83	3,74
60	2,20	2,80	1,17	1,83
61	2,60	2,40	1,33	3,67
62	2,19	2,20	1,00	3,67
63	2,46	2,78	1,50	3,66
64	3,00	2,81	1,00	4,00
65	2,01	2,60	1,33	3,00
66	2,40	2,80	1,33	3,74
67	2,60	2,80	1,33	3,50
68	2,26	2,61	1,41	3,66
69	2,27	2,81	1,00	3,67
70	2,40	2,80	1,50	4,00
TOTAL	2,55874939	2,83464856	1,58487654	3,42

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,417	20,076	20,076	4,417	20,076	20,076	3,938	17,901	17,901
2	3,577	16,260	36,336	3,577	16,260	36,336	3,661	16,640	34,541
3	2,901	13,187	49,523	2,901	13,187	49,523	3,250	14,772	49,313
4	2,435	11,066	60,589	2,435	11,066	60,589	2,481	11,277	60,589
5	2,025	9,206	69,795						
6	1,485	6,752	76,547						
7	1,161	5,277	81,824						
8	,912	4,146	85,970						
9	,764	3,473	89,443						
10	,624	2,836	92,279						
11	,580	2,636	94,915						
12	,314	1,429	96,344						
13	,288	1,311	97,655						
14	,198	,898	98,554						
15	,145	,661	99,215						
16	,090	,411	99,626						
17	,047	,216	99,842						
18	,031	,141	99,983						
19	,004	,017	100,000						
20	1,687E-016	7,668E-016	100,000						
21	3,858E-017	1,754E-016	100,000						
22	-3,990E-016	-1,814E-015	100,000						
Extraction Method: Principal Component Analysis.									

Table 5: Confirmatory PCA cultural theory for Santiago Comaltepec

Table 6 Confirmatory PCA cultural theory for Consejos Comunitarios

KMO and Bartlett's Test		
KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY.		,304
Bartlett's Test of Sphericity	Approx. Chi-Square	443,266
	df	231
	Sig.	,000

TOTAL VARIANCE EXPLAINED									
COMPONENT	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,334	24,244	24,244	5,334	24,244	24,244	4,060	18,456	18,456
2	2,624	11,928	36,172	2,624	11,928	36,172	3,199	14,540	32,996
3	2,163	9,833	46,005	2,163	9,833	46,005	2,581	11,732	44,729
4	1,782	8,099	54,104	1,782	8,099	54,104	2,063	9,376	54,104
5	1,658	7,535	61,639						
6	1,545	7,023	68,662						
7	1,324	6,018	74,680						
8	1,054	4,792	79,472						
9	,826	3,756	83,228						
10	,746	3,390	86,618						
11	,622	2,826	89,444						
12	,445	2,023	91,467						
13	,420	1,909	93,376						
14	,385	1,749	95,125						
15	,272	1,237	96,362						
16	,248	1,129	97,491						
17	,178	,809	98,300						
18	,130	,592	98,891						
19	,109	,497	99,388						
20	,089	,407	99,795						
21	,031	,142	99,937						
22	,014	,063	100,000						
Extraction Method: Principal Component Analysis.									

Table 7: Confirmatory PCA cultural theory joint databases

KMO AND BARTLETT'S TEST		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,538
Bartlett's Test of Sphericity	Approx. Chi-Square	520,139
	df	231
	Sig.	,000

TOTAL VARIANCE EXPLAINED									
COMPONENT	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,200	19,090	19,090	4,200	19,090	19,090	3,177	14,440	14,440
2	3,752	17,057	36,146	3,752	17,057	36,146	3,117	14,167	28,607
3	1,910	8,683	44,829	1,910	8,683	44,829	2,790	12,681	41,288
4	1,727	7,852	52,681	1,727	7,852	52,681	2,506	11,393	52,681
5	1,478	6,719	59,400						
6	1,316	5,983	65,383						
7	1,244	5,655	71,038						
8	,954	4,334	75,372						
9	,839	3,812	79,185						
10	,745	3,387	82,572						
11	,676	3,073	85,645						
12	,572	2,599	88,243						
13	,496	2,253	90,496						
14	,422	1,916	92,412						
15	,336	1,528	93,940						
16	,296	1,348	95,287						
17	,278	1,264	96,552						
18	,224	1,016	97,568						
19	,200	,908	98,476						
20	,142	,645	99,121						
21	,124	,564	99,685						
22	,069	,315	100,000						
Extraction Method: Principal Component Analysis.									

Table 8: Reliability Analysis cultural theory for Santiago Comaltepec

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
SANTIAGO COMALTEPEC INDIVIDUALIST INDEX				,060
In a fair system people with more ability should earn more	2,00	,324	,-.046	
In this country the brightest should make it the top	2,35	,489	.278	
It is just as well that life tends to sort out those who try harder from those who don't	2,95	,394	.-091	
The welfare state tends to destroy individual initiative	3,00	,795	.064	
If a person has the get-up-and-go to acquire wealth , that person should have the right to enjoy it	2,35	,671	-.031	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
SANTIAGO COMALTEPEC EGALITARIAN INDEX				,803
If people in this country were treated more equally we would have fewer problems	3,90	,305	.827	
Those who get ahead should be taxed more to support the less fortunate	3,47	1.456	.834	
The difference between rich and poor nations isn't right	3,73	1.363	.704	
Racial discrimination is very serious problem in our society	4,33	1.971	.731	
What this country needs is a "fairness revolution" to make the distribution of good more equal	3,83	.592	.719	
The government should make sure everyone has a good standard of living	3,83	.592	.778	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
SANTIAGO COMALTEPEC HIERARCHICAL INDEX				,599
I think there should be more discipline in the youth of today	3,65	,587	.529	
I am more strict than most people about what is right and wrong	2,20	,523	.605	
I value regular routines highly	1,85	,745	.577	
I think being on time is very important	3,60	,598	.439	
People should be rewarded according to their position in society	1,85	,671	.555	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
SANTIAGO COMALTEPEC FATALIST INDEX				,768
Cooperating with others rarely works	3,90	.758	.733	
I have often been treated unfairly	3,47	.702	.712	
A person is better off if he or she doesn't trust anyone	3,73	2.097	.721	
I don't worry too much about politics because I can´t influence things very much	4,33	1.243	.711	
There is no use in doing things for people- you only get in the neck in the long run	3,83	.305	.817	
The future is too uncertain for a person to make serious plan	3,83	.626	.667	

Table 9: Reliability Analysis Cultural Theory for Consejos Comunitarios

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
CONSEJOS COMUNITARIOS INDIVIDUALIST INDEX				,106
In a fair system people with more ability should earn more	1,75	,851	.243	
In this country the brightest should make it the top	1,35	,813	.-195	
it is just as well that life tends to sort out those who try harder from those who don't	1,50	,761	.229	
The welfare state tends to destroy individual initiative	2,00	,562	.272	
If a person has the get-up-and-go to acquire wealth , that person should have the right to enjoy it	1,10	,308	-.273	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
CONSEJOS COMUNITARIOS EGALITARIAN INDEX				,563
If people in this country were treated more equally we would have fewer problems	3,85	,366	.392	
Those who get ahead should be taxed more to support the less fortunate	3,15	,813	.648	
The difference between rich and poor nations isn't right	3,50	,761	.638	
Racial discrimination is very serious problem in our society	3,40	,754	.497	
What this country needs is a "fairness revolution" to make the distribution of good more equal	3,80	,696	.508	
The government should make sure everyone has a good standard of living	3,75	,716	.360	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
CONSEJOS COMUNITARIOS HIERARCHICAL INDEX	3,63			.133
I think there should be more discipline in the youth of today	2,91	,490	.-116	
I am more strict than most people about what is right and wrong	2,83	,702	.463	
I value regular routines highly	3,66	,618	-.065	
I think being on time is very important	2,71	,482	-.112	
People should be rewarded according to their position in society	3,63	,789	.199	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
CONSEJOS COMUNITARIOS FATALIST INDEX				.775
Cooperating with others rarely works	2,11	1,051	.736	
I have often been treated unfairly	1,89	,900	.752	
A person is better off if he or she doesn't trust anyone	2,17	,985	.728	
I don't worry too much about politics because I can´t influence things very much	1,97	,747	.763	
There is no use in doing things for people- you only get in the neck in the long run	1,57	1,008	.769	
The future is too uncertain for a person to make serious plan	1,77	1,060	.690	

Table 10: Reliability analysis Cultural Theory for joint databases

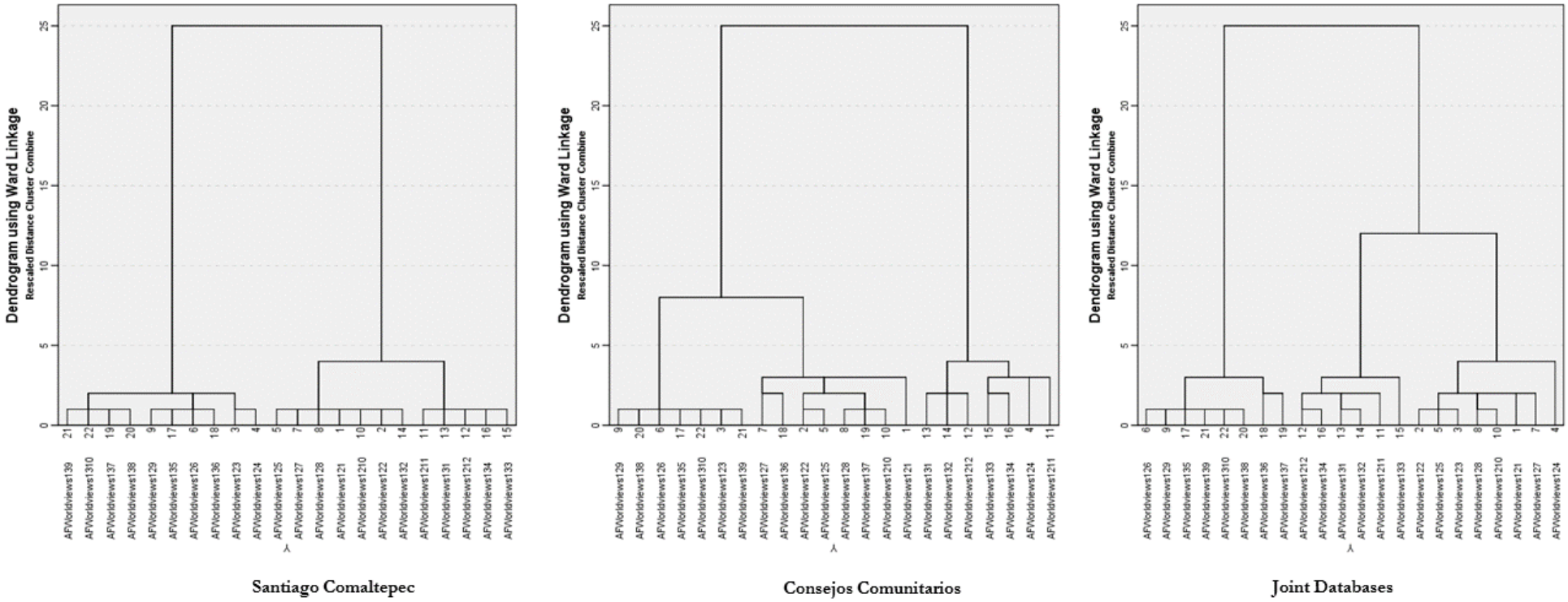
	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
GLOBAL INDIVIDUALIST INDEX				,009
In a fair system people with more ability should earn more	2,28	,738	-,036	
In this country the brightest should make it the top	2,69	,609	-,236	
it is just as well that life tends to sort out those who try harder from those who don't	3,11	,462	-,008	
The welfare state tends to destroy individual initiative	2,50	,927	,455	
If a person has the get-up-and-go to acquire wealth , that person should have the right to enjoy it	2,70	,743	-,456	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
GLOBAL EGALITARIAN INDEX				,718
If people in this country were treated more equally we would have fewer problems	3,50	,505	,677	
Those who get ahead should be taxed more to support the less fortunate	3,02	,765	,762	
The difference between rich and poor nations isn't right	3,09	,759	,660	
Racial discrimination is very serious problem in our society	3,56	,604	,696	
What this country needs is a "fairness revolution" to make the distribution of good more equal	3,50	,607	,625	
The government should make sure everyone has a good standard of living	3,56	,604	,642	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
GLOBAL HIERARCHICAL INDEX				.517
I think there should be more discipline in the youth of today	3,63	,525	,514	
I am more strict than most people about what is right and wrong	2,65	,731	,541	
I value regular routines highly	2,46	,818	,319	
I think being on time is very important	3,63	,525	,459	
People should be rewarded according to their position in society	2,39	,856	,418	

	MEAN	STD DEV	ALPHA IF ITEM DELETED	ALPHA
GLOBAL FATALIST INDEX				.796
Cooperating with others rarely works	2,00		,991	,762
I have often been treated unfairly	1,70		,903	,764
A person is better off if he or she doesn't trust anyone	1,91		,957	,748
I don't worry too much about politics because I can´t influence things very much	1,98		,687	,788
There is no use in doing things for people- you only get in the neck in the long run	1,41		,858	,800
The future is too uncertain for a person to make serious plan	1,59		,981	.7178

Figure 1: Hierarchical Cluster Analysis for Cultural bias items for Santiago Comaltepec, Consejos Comunitarios and joint dabatases



Cultural theory and sociodemographic factors

Table 11: Mean and standard deviation cultural theory scales

Descriptive Statistics				
	Country	**Mean**	**Std. Deviation**	**N**
Individualism	Colombia	2,7667	,40932	39
	Mexico	2,4917	,26351	30
	Total	2,6471	,37696	69
Hierarchy	Colombia	3,1718	,35905	39
	Mexico	2,6907	,35480	30
	Total	2,9626	,42831	69
Fatalism	Colombia	1,9308	,67049	39
	Mexico	1,4630	,41617	30
	Total	1,7274	,61616	69
Egalitarianism	Colombia	3,2487	,30854	39
	Mexico	3,5927	,43476	30
	Total	3,3983	,40411	69

Table 12: MANOVA test country

MULTIVARIATE TESTS[A]						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,993	2235,317b	4,000	64,000	,000
	Wilks' Lambda	,007	2235,317b	4,000	64,000	,000
	Hotelling's Trace	139,707	2235,317b	4,000	64,000	,000
	Roy's Largest Root	139,707	2235,317b	4,000	64,000	,000
Country	Pillai's Trace	**,583**	**22,366b**	**4,000**	**64,000**	,000
	Wilks' Lambda	,417	22,366b	4,000	64,000	,000
	Hotelling's Trace	1,398	22,366b	4,000	64,000	,000
	Roy's Largest Root	1,398	22,366b	4,000	64,000	,000
a Design: Intercept + Country						
b Exact statistic						

Univariate test country

Tests of Between-Subjects Effects						
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Individualism	1,732[a]	1	1,732	10,063	,002
	Hierarchy	3,817[b]	1	3,817	29,905	,000
	Fatalism	4,516[c]	1	4,516	15,466	,000
	Egalitarianism	2,026[d]	1	2,026	15,073	,000
Intercept	Individualism	479,240	1	479,240	2784,090	,000
	Hierarchy	584,096	1	584,096	4576,074	,000
	Fatalism	189,394	1	189,394	648,648	,000
	Egalitarianism	793,246	1	793,246	5901,861	,000
Country	Individualism	**1,732**	1	1,732	10,063	,002
	Hierarchy	**3,817**	1	3,817	29,905	,000
	Fatalism	**4,516**	1	4,516	15,466	,000
	Egalitarianism	**2,026**	1	2,026	15,073	,000
Error	Individualism	11,533	67	,172		
	Hierarchy	8,552	67	,128		
	Fatalism	19,563	67	,292		
	Egalitarianism	9,005	67	,134		
Total	Individualism	508,476	69			
	Hierarchy	619,171	69			
	Fatalism	224,589	69			
	Egalitarianism	807,402	69			
Corrected Total	Individualism	13,265	68			
	Hierarchy	12,369	68			
	Fatalism	24,079	68			
	Egalitarianism	11,031	68			
a. R Squared = ,131 (Adjusted R Squared = ,118)						
b. R Squared = ,309 (Adjusted R Squared = ,298)						
c. R Squared = ,188 (Adjusted R Squared = ,175)						
d. R Squared = ,184 (Adjusted R Squared = ,171)						

Initial statistics for discriminant analysis country I

Eigenvalues				
Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	1,398[a]	100,0	100,0	,764
a. First 1 canonical discriminant functions were used in the analysis.				

Initial statistics for discriminant analysis country II

WILKS' LAMBDA				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	**,417**	**56,848**	4	,000

Standardized Canonical Discriminant Function Coefficients

	Function
	1
Individualism	,238
Hierarchy	,659
Fatalism	,558
Egalitarianism	-,804

Structure Matrix

	Function
	1
Individualism	,565
Hierarchy	,406
Fatalism	-,401
Egalitarianism	,328

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions
Variables ordered by absolute size of correlation within function.

Table 13: MANOVA test: age

Multivariate Tests[a]						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,992	1996,418[b]	4,000	63,000	,000
	Wilks' Lambda	,008	1996,418[b]	4,000	63,000	,000
	Hotelling's Trace	126,757	1996,418[b]	4,000	63,000	,000
	Roy's Largest Root	126,757	1996,418[b]	4,000	63,000	,000
	Pillai's Trace	**,133**	**1,144**	**8,000**	**128,000**	,339
	Wilks' Lambda	,870	1,135[b]	8,000	126,000	,345
	Hotelling's Trace	,145	1,126	8,000	124,000	,351
	Roy's Largest Root	,107	1,717[c]	4,000	64,000	,157
a. Design: Intercept + Age						
b. Exact statistic						
c. The statistic is an upper bound on F that yields a lower bound on the significance level.						

Univariate test age

Tests of Between-Subjects Effects						
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Individualism	,472[a]	2	,236	1,216	,303
	Hierarchy	,355[b]	2	,177	,974	,383
	Fatalism	1,723[c]	2	,861	2,543	,086
	Egalitarianism	,062[d]	2	,031	,188	,829
Intercept	Individualism	434,784	1	434,784	2242,964	,000
	Hierarchy	541,545	1	541,545	2974,898	,000
	Fatalism	188,516	1	188,516	556,547	,000
	Egalitarianism	695,747	1	695,747	4186,356	,000
Age	Individualism	**,236**	2	**,236**	1,216	,303
	Hierarchy	**,177**	2	**,177**	,974	,383
	Fatalism	**,861**	2	**,861**	2,543	,086
	Egalitarianism	**,031**	2	**,031**	,188	,829
Error	Individualism	12,794	66	,194		
	Hierarchy	12,015	66	,182		
	Fatalism	22,356	66	,339		

	Egalitarianism	10,969	66	,166		
Total	Individualism	508,476	69			
	Hierarchy	619,171	69			
	Fatalism	224,589	69			
	Egalitarianism	807,402	69			
Corrected Total	Individualism	13,265	68			
	Hierarchy	12,369	68			
	Fatalism	24,079	68			
	Egalitarianism	11,031	68			
a. R Squared = ,036 (Adjusted R Squared = ,006)						
b. R Squared = ,029 (Adjusted R Squared = -,001)						
c. R Squared = ,072 (Adjusted R Squared = ,043)						
d. R Squared = ,006 (Adjusted R Squared = -,024)						

Table 14: MANOVA tests gender

MULTIVARIATE TESTS[A]						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,993	2183,247[b]	4,000	64,000	,000
	Wilks' Lambda	,007	2183,247[b]	4,000	64,000	,000
	Hotelling's Trace	136,453	2183,247[b]	4,000	64,000	,000
	Roy's Largest Root	136,453	2183,247[b]	4,000	64,000	,000
Gender	Pillai's Trace	**,069**	**1,183[b]**	**4,000**	**64,000**	,327
	Wilks' Lambda	,931	1,183[b]	4,000	64,000	,327
	Hotelling's Trace	,074	1,183[b]	4,000	64,000	,327
	Roy's Largest Root	,074	1,183[b]	4,000	64,000	,327
a. Design: Intercept + Gender						
b. Exact statistic						

Univariate test gender

TESTS OF BETWEEN-SUBJECTS EFFECTS						
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Individualism	,053[a]	1	,053	,270	,605
	Hierarchy	,112[b]	1	,112	,611	,437
	Fatalism	1,471[c]	1	1,471	4,361	,041
	Egalitarianism	,048[d]	1	,048	,290	,592
Intercept	Individualism	475,733	1	475,733	2412,523	,000
	Hierarchy	582,218	1	582,218	3182,491	,000
	Fatalism	187,089	1	187,089	554,469	,000
	Egalitarianism	770,381	1	770,381	4699,302	,000
Gender	Individualism	**,053**	1	**,053**	,270	,605
	Hierarchy	**,112**	1	**,112**	,611	,437
	Fatalism	**1,471**	1	**1,471**	4,361	,041
	Egalitarianism	**,048**	1	**,048**	,290	,592
Error	Individualism	13,212	67	,197		
	Hierarchy	12,257	67	,183		
	Fatalism	22,607	67	,337		
	Egalitarianism	10,984	67	,164		
Total	Individualism	508,476	69			
	Hierarchy	619,171	69			
	Fatalism	224,589	69			
	Egalitarianism	807,402	69			
Corrected Total	Individualism	13,265	68			
	Hierarchy	12,369	68			
	Fatalism	24,079	68			
	Egalitarianism	11,031	68			
a. R Squared = ,004 (Adjusted R Squared = -,011)						
b. R Squared = ,009 (Adjusted R Squared = -,006)						
c. R Squared = ,061 (Adjusted R Squared = ,047)						
d. R Squared = ,004 (Adjusted R Squared = -,011)						

Table 15: MANOVA test education

Descriptive Statistics				
	NivAcad	Mean	Std. Deviation	N
Individualism	Educación Primaria	2,5747	,27518	17
	Educación Media	2,8109	,55506	33
	Educación Superior	2,5400	,25221	18
	Total	2,6801	,44485	68
Hierarchy	Educación Primaria	3,0988	,27554	17
	Educación Media	3,0158	,44979	33
	Educación Superior	2,7122	,40129	18
	Total	2,9562	,42251	68
Fatalism	Educación Primaria	1,8051	,58309	17
	Educación Media	1,7917	,68034	33
	Educación Superior	1,4061	,26217	18
	Total	1,6930	,59144	68
Egalitarianism	Educación Primaria	3,4357	,52934	17
	Educación Media	3,3405	,36555	33
	Educación Superior	3,4594	,34813	18
	Total	3,3958	,40557	68

Multivariate Tests[a]						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,992	2044,627[b]	4,000	62,000	,000
	Wilks' Lambda	,008	2044,627[b]	4,000	62,000	,000
	Hotelling's Trace	131,911	2044,627[b]	4,000	62,000	,000
	Roy's Largest Root	131,911	2044,627[b]	4,000	62,000	,000
Education	Pillai's Trace	**,258**	**2,332**	**8,000**	**126,000**	,023
	Wilks' Lambda	,757	2,315[b]	8,000	124,000	,024
	Hotelling's Trace	,301	2,298	8,000	122,000	,025
	Roy's Largest Root	,205	3,233[c]	4,000	63,000	,018
a. Design: Intercept + NivAcad						
b. Exact statistic						
c. The statistic is an upper bound on F that yields a lower bound on the significance level.						

Univariate test education

TESTS OF BETWEEN-SUBJECTS EFFECTS							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Individualism	1,107[a]	2	,553	2,960	,059	,083
	Hierarchy	1,534[b]	2	,767	4,783	,012	,128
	Fatalism	2,017[c]	2	1,008	3,060	,054	,086
	Egalitarianism	,201[d]	2	,100	,603	,550	,018
Intercept	Individualism	434,161	1	434,161	2322,273	,000	,973
	Hierarchy	538,508	1	538,508	3357,186	,000	,981
	Fatalism	172,995	1	172,995	524,959	,000	,890
	Egalitarianism	724,127	1	724,127	4350,276	,000	,985
Education	Individualism	1,107	2	**,553**	2,960	,059	,083
	Hierarchy	1,534	2	**,767**	4,783	,012	,128
	Fatalism	2,017	2	**1,008**	3,060	,054	,086
	Egalitarianism	,201	2	**,100**	,603	,550	,018
Error	Individualism	12,152	65	,187			
	Hierarchy	10,426	65	,160			
	Fatalism	21,420	65	,330			
	Egalitarianism	10,820	65	,166			
Total	Individualism	501,716	68				
	Hierarchy	606,211	68				
	Fatalism	218,339	68				
	Egalitarianism	795,152	68				
Corrected Total	Individualism	13,259	67				
	Hierarchy	11,961	67				
	Fatalism	23,437	67				
	Egalitarianism	11,020	67				
a. R Squared = ,083 (Adjusted R Squared = ,055)							
b. R Squared = ,128 (Adjusted R Squared = ,101)							
c. R Squared = ,086 (Adjusted R Squared = ,058)							
d. R Squared = ,018 (Adjusted R Squared = -,012)							

MULTIPLE COMPARISONS								
Dependent Variable		(I) NivAcad	(J) NivAcad	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Individualim	Tukey HSD	Primary Education	Educación Media	-,2362	,12908	,168	-,5458	,0734
			Educación Superior	,0347	,14623	,969	-,3160	,3855
		Secondary Education	Educación Primaria	,2362	,12908	,168	-,0734	,5458
			Educación Superior	,2709	,12670	,090	-,0330	,5748
		Higher Education	Educación Primaria	-,0347	,14623	,969	-,3855	,3160
			Educación Media	-,2709	,12670	,090	-,5748	,0330
			Educación Media	-,2709	,11345	,054	-,5453	,0035
Hierarchy	Tukey HSD	Primary Education	Educación Media	,0831	,11957	,767	-,2037	,3699
			Educación Superior	,3866*	,13545	,016	,0617	,7115
		Secondary Education	Educación Primaria	-,0831	,11957	,767	-,3699	,2037
			Educación Superior	,3035*	,11735	,032	,0221	,5850
		Higher Education	Educación Primaria	-,3866*	,13545	,016	-,7115	-,0617
			Educación Media	-,3035*	,11735	,032	-,5850	-,0221
Fatalims	Tukey HSD	Primary Education	Educación Media	,0134	,17138	,997	-,3977	,4244
			Educación Superior	,3990	,19415	,107	-,0667	,8647
		Secondary Education	Educación Primaria	-,0134	,17138	,997	-,4244	,3977
			Educación Superior	,3856	,16821	,064	-,0178	,7891
		Higher Education	Educación Primaria	-,3990	,19415	,107	-,8647	,0667
			Educación Media	-,3856	,16821	,064	-,7891	,0178
			Educación Superior	,3856*	,13358	,016	,0620	,7093
		Educación Superior	Educación Primaria	-,3990*	,15433	,043	-,7868	-,0112
			Educación Media	-,3856*	,13358	,016	-,7093	-,0620
Egalitarianism	Tukey HSD	Educación Primaria	Educación Media	,0952	,12180	,716	-,1970	,3873
			Educación Superior	-,0238	,13798	,984	-,3547	,3072
		Educación Media	Educación Primaria	-,0952	,12180	,716	-,3873	,1970
			Educación Superior	-,1189	,11955	,583	-,4057	,1678
		Educación Superior	Educación Primaria	,0238	,13798	,984	-,3072	,3547

MULTIPLE COMPARISONS								
			Educación Media	,1189	,11955	,583	-,1678	,4057
			Educación Media	,1189	,10384	,493	-,1347	,3726

Based on observed means.
The error term is Mean Square(Error) = ,166.
***. The mean difference is significant at the ,05 level.**

Initial Statistics

Eigenvalues				
Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	,205[a]	**68,1**	68,1	,413
2	,096[a]	**31,9**	100,0	,296

a. First 2 canonical discriminant functions were used in the analysis.

Initial Statistics II

Wilks' Lambda				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 2	**,757**	**17,679**	**8**	,024
2	**,912**	5,822	3	,121

Standardized Canonical Discriminant Function Coefficients

Standardized Canonical Discriminant Function Coefficients		
	Function	
	1	2
Individualism	,008	,997
Hierarchy	,704	-,543
Fatalism	,533	-,009
Egalitarianism	-,241	-,366

Structure Matrix

Structure Matrix		
	Function	
	1	2
Individualism	,839*	-,169
Hierarchy	,676*	,057
Fatalism	,392	,787*
Egalitarianism	-,191	-,339*
Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions Variables ordered by absolute size of correlation within function.		
***. Largest absolute correlation between each variable and any discriminant function**		

Functions at group centroids

Functions at Group Centroids		
Education	Function	
	1	2
Primary education	,329	-,474
Medium education	,232	,269
Higher education	-,735	-,045
Unstandardized canonical discriminant functions evaluated at group means		

Canonical Discriminant function education

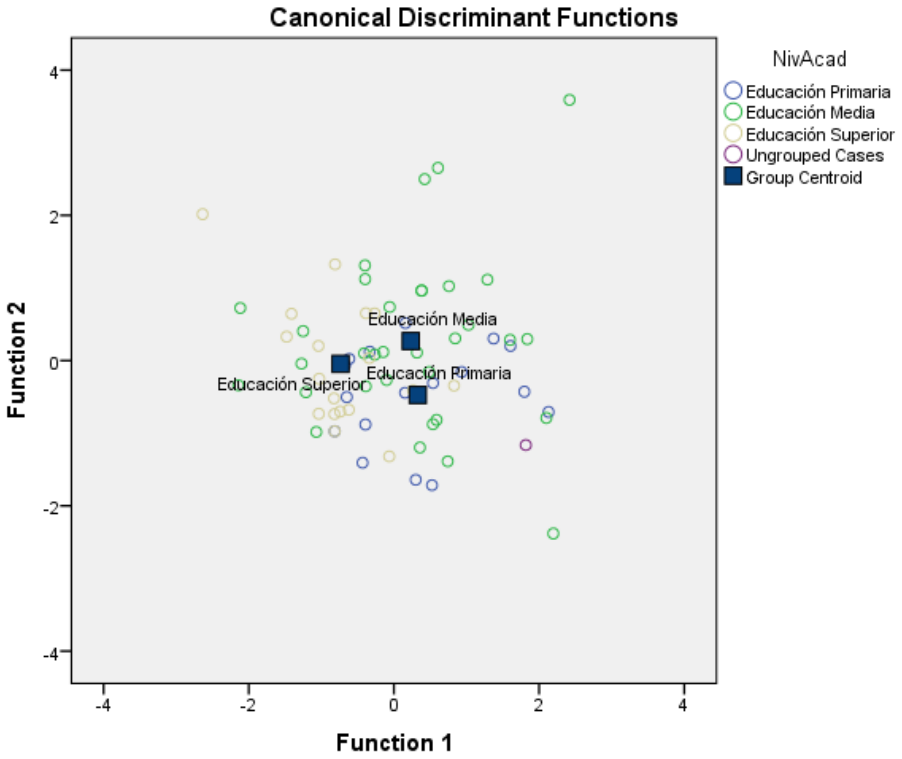


Table 16: MANOVA test ideology

Multivariate Tests[a]						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,990	1452,736[b]	4,000	56,000	,000
	Wilks' Lambda	,010	1452,736[b]	4,000	56,000	,000
	Hotelling's Trace	103,767	1452,736[b]	4,000	56,000	,000
	Roy's Largest Root	103,767	1452,736[b]	4,000	56,000	,000
Ideology	Pillai's Trace	**,652**	**2,875**	**16,000**	**236,000**	,000
	Wilks' Lambda	,421	3,512	16,000	171,720	,000
	Hotelling's Trace	1,202	4,095	16,000	218,000	,000
	Roy's Largest Root	1,039	15,329[c]	4,000	59,000	,000
a. Design: Intercept + Ideologia						
b. Exact statistic						
c. The statistic is an upper bound on F that yields a lower bound on the significance level.						

Univariate test ideology

TESTS OF BETWEEN-SUBJECTS EFFECTS						
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Individualism	1,803[a]	4	,451	2,347	,065
	Hierarchy	2,033[b]	4	,508	3,787	,008
	Fatalism	3,960[c]	4	,990	3,025	,025
	Egalitarianism	3,238[d]	4	,809	6,447	,000
Intercept	Individualism	295,138	1	295,138	1536,844	,000
	Hierarchy	368,582	1	368,582	2745,854	,000
	Fatalism	122,326	1	122,326	373,712	,000
	Egalitarianism	507,413	1	507,413	4041,291	,000
Ideology	Individualism	1,803	4	**,451**	2,347	,065
	Hierarchy	2,033	4	**,508**	3,787	,008
	Fatalism	3,960	4	**,990**	3,025	,025
	Egalitarianism	3,238	4	**,809**	6,447	,000
Error	Individualism	11,330	59	,192		
	Hierarchy	7,920	59	,134		
	Fatalism	19,312	59	,327		
	Egalitarianism	7,408	59	,126		
Total	Individualism	471,093	64			
	Hierarchy	578,835	64			
	Fatalism	210,803	64			
	Egalitarianism	754,662	64			
Corrected Total	Individualism	13,133	63			
	Hierarchy	9,953	63			
	Fatalism	23,273	63			
	Egalitarianism	10,646	63			
a. R Squared = ,137 (Adjusted R Squared = ,079)						
b. R Squared = ,204 (Adjusted R Squared = ,150)						
c. R Squared = ,170 (Adjusted R Squared = ,114)						
d. R Squared = ,304 (Adjusted R Squared = ,257)						

Dependent Variable		Ideology (I)	Ideology (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Individualism	Tukey HSD	Izquierda	Centro Izquierda	,1147	,10538	,699	-,1708	,4002
			Centro Derecha	-,0973	,14318	,904	-,4852	,2906
			Derecha	-,1213	,14318	,832	-,5092	,2666
		Centro Izquierda	Izquierda	-,1147	,10538	,699	-,4002	,1708
			Centro Derecha	-,2120	,13708	,423	-,5834	,1594
			Derecha	-,2360	,13708	,330	-,6074	,1354
		Centro Derecha	Izquierda	,0973	,14318	,904	-,2906	,4852
			Centro Izquierda	,2120	,13708	,423	-,1594	,5834
			Derecha	-,0240	,16789	,999	-,4789	,4309
		Derecha	Izquierda	,1213	,14318	,832	-,2666	,5092
			Centro Izquierda	,2360	,13708	,330	-,1354	,6074
			Centro Derecha	,0240	,16789	,999	-,4309	,4789
Hierarchy	Tukey HSD	Izquierda	Centro Izquierda	-,1269	,19082	,909	-,6439	,3901
			Centro Derecha	-,1709	,25928	,912	-,8734	,5316
			Derecha	-,2869	,25928	,688	-,9894	,4156
		Centro Izquierda	Izquierda	,1269	,19082	,909	-,3901	,6439
			Centro Derecha	-,0440	,24824	,998	-,7166	,6286
			Derecha	-,1600	,24824	,917	-,8326	,5126
		Centro Derecha	Izquierda	,1709	,25928	,912	-,5316	,8734
			Centro Izquierda	,0440	,24824	,998	-,6286	,7166
			Derecha	-,1160	,30403	,981	-,9397	,7077
		Derecha	Izquierda	,2869	,25928	,688	-,4156	,9894
			Centro Izquierda	,1600	,24824	,917	-,5126	,8326
			Centro Derecha	,1160	,30403	,981	-,7077	,9397
Fatalism	Tukey HSD	Izquierda	Centro Izquierda	,3267	,22585	,481	-,2852	,9386

MULTIPLE COMPARISONS

Dependent Variable		Ideology (I)	Ideology (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
			Centro Derecha	-,2420	,30687	,859	-1,0734	,5894
			Derecha	,0140	,30687	1,000	-,8174	,8454
		Centro Izquierda	Izquierda	-,3267	,22585	,481	-,9386	,2852
			Centro Derecha	-,5687	,29380	,234	-1,3647	,2274
			Derecha	-,3127	,29380	,713	-1,1087	,4834
		Centro Derecha	Izquierda	,2420	,30687	,859	-,5894	1,0734
			Centro Izquierda	,5687	,29380	,234	-,2274	1,3647
			Derecha	,2560	,35984	,892	-,7189	1,2309
		Derecha	Izquierda	-,0140	,30687	1,000	-,8454	,8174
			Centro Izquierda	,3127	,29380	,713	-,4834	1,1087
			Centro Derecha	-,2560	,35984	,892	-1,2309	,7189
Egalitarianism	Tukey HSD	Izquierda	Centro Izquierda	-,2473	,16745	,463	-,7010	,2063
			Centro Derecha	-,1280	,22751	,942	-,7444	,4884
			Derecha	,1120	,22751	,960	-,5044	,7284
		Centro Izquierda	Izquierda	,2473	,16745	,463	-,2063	,7010
			Centro Derecha	,1193	,21783	,946	-,4708	,7095
			Derecha	,3593	,21783	,366	-,2308	,9495
		Centro Derecha	Izquierda	,1280	,22751	,942	-,4884	,7444
			Centro Izquierda	-,1193	,21783	,946	-,7095	,4708
			Derecha	,2400	,26678	,805	-,4828	,9628
		Derecha	Izquierda	-,1120	,22751	,960	-,7284	,5044
			Centro Izquierda	-,3593	,21783	,366	-,9495	,2308
			Centro Derecha	-,2400	,26678	,805	-,9628	,4828

Multiple Comparisons

Based on observed means.
The error term is Mean Square(Error) = ,178.

Initial statistics discriminant analysis ideology

EIGENVALUES				
Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	,492[a]	58,9	58,9	,574
2	,329[a]	39,4	98,3	,497
3	,014[a]	1,7	100,0	,119
a. First 3 canonical discriminant functions were used in the analysis.				

Initial statistics discriminant analysis ideology II

WILKS' LAMBDA				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 3	,497	21,651	12	,042
2 through 3	,742	9,256	6	,160
3	,986	,444	2	,801

Standardized Canonical Discriminant Function Coefficients

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS			
	Function		
	1	2	3
Individualism	,769	,133	,662
Hierarchy	,356	-,602	-,036
Fatalism	,368	,779	-,592
Egalitarianism	-,675	,495	,370

Structure Matrix ideology

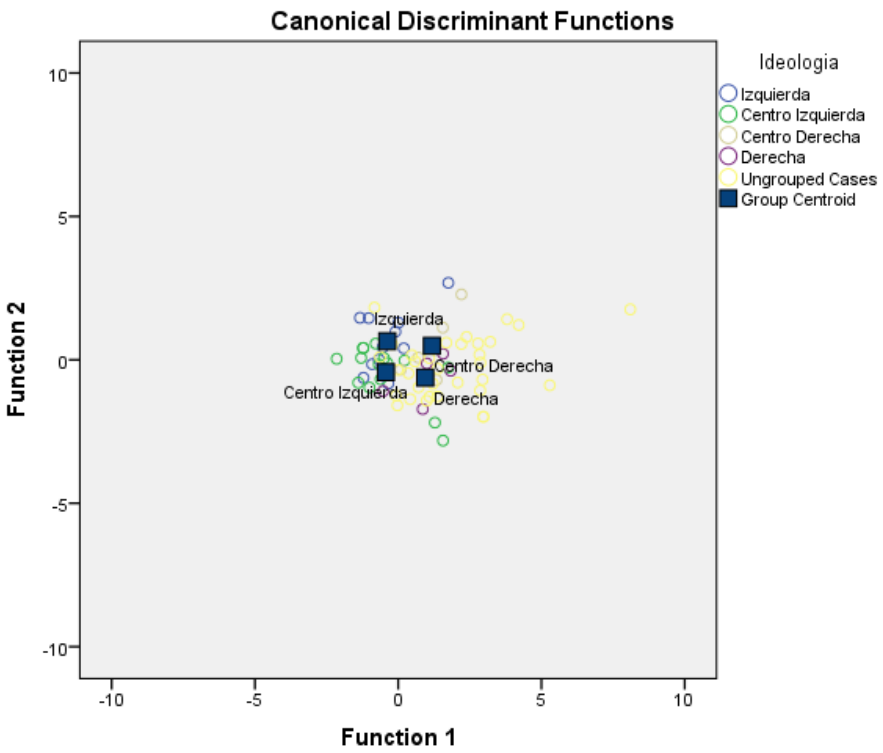
STRUCTURE MATRIX			
	FUNCTION		
	1	2	3
Individualism	,432*	-,294	-,088
Hierarchy	,440	,669*	-,525
Fatalism	-,329	,533*	,519
Egalitarianism	,601	,284	,747*
Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions Variables ordered by absolute size of correlation within function.			

*. Largest absolute correlation between each variable and any discriminant function

Functions at group centroids

FUNCTIONS AT GROUP CENTROIDS			
IDEOLOGY	FUNCTION		
	1	2	3
Left	-,380	,648	-,081
Centre-left	-,428	-,431	,067
Centre-right	1,177	,489	,169
Right	,945	-,621	-,191
Unstandardized canonical discriminant functions evaluated at group means			

Canonical discriminant functions ideology



Simple linear regression cultural bias and importance of climate change

Table 17: Correlations between cultural bias and importance of climate change Consejos Comunitarios

Correlations						
		1	2	3	4	5
1-Individualism	Correlation Coefficient	1,000				
2-Hierarchy	Correlation Coefficient	,330*	1,000			
3-Fatalism	Correlation Coefficient	,071	,241	1,000		
4-Egalitarianism	Correlation Coefficient	,080	,364*	,514**	1,000	
5- Importance of climate change	Correlation Coefficient	-,159	-,019	-,193	,073	1,000
***. Correlation is significant at the 0.05 level (2-tailed).**						
****. Correlation is significant at the 0.01 level (2-tailed).**						

Table 18: Correlations between cultural bias and importance of climate change Santiago Comaltepec

Correlations						
		1	2	3	4	5
1-Individualism	Correlation Coefficient	1,000				
2-Hierarchy	Correlation Coefficient	,097	1,000			
3-Fatalism	Correlation Coefficient	-,015	-,229	1,000		
4-Egalitarianism	Correlation Coefficient	,219	,124	,114	1,000	
5- Importance of climate change	Correlation Coefficient	,039	-,375*	,250	,305	1,000
***. Correlation is significant at the 0.05 level (2-tailed).**						

Table 19: Correlations between cultural bias and importance of climate change joint databases

Correlations						
		1	2	3	4	5
1-Individualism	Correlation Coefficient	1,000				
2-Hierarchy	Correlation Coefficient	,426**	1,000			
3-Fatalism	Correlation Coefficient	,117	,245*	1,000		
4-Egalitarianism	Correlation Coefficient	-,079	-,105	,088	1,000	
5- Importance of climate change	Correlation Coefficient	-,230	-,263*	-,212	,228	1,000
****. Correlation is significant at the 0.01 level (2-tailed).**						
***. Correlation is significant at the 0.05 level (2-tailed).**						

Table 20: Hierarchy predicting importance to climate change Santiago Comaltepec

	B	SE B	β	R^{2*}
HIERARCHY				
CONSTANT	4,790	3,40		
HIERARCHY	-,269	,125	-,376	,141
***P<.05**				

Table 21: Hierarchy predicting importance to climate change joint databases

	B	SE B	β	R^{2*}
HIERARCHY				
CONSTANT	4,923	,510		
HIERARCHY	-.356	,170	-,247	,061
***P<.05**				

Table 22: Regression hierarchy and importance of climate change joint databases

Model Summary[b]										
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Change Statistics**					**Durbin-Watson**
					R Square Change	**F Change**	**df1**	**df2**	**Sig. F Change**	
1	**,247[a]**	**,061**	**,047**	**,602**	**,061**	**4,360**	**1**	**67**	**,041**	**2,322**
a. Predictors: (Constant), Hierarchy										
b. Dependent Variable: Importance of climate change										

Coefficients[a]									
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	4,923	,510		9,657	,000			
	Hierarchy	-,356	,170	-,247	-2,088	,041	-,247	-,247	-,247
a. Dependent Variable: Importance of climate change									

Table 23: Regression hierarchy and importance of climate change Santiago Comaltepec

Model Summary[b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,376[a]	,141	,111	,239	,141	4,608	1	28	,041	2,305
a. Predictors: (Constant), HIerarchicalMEAN										
b. Dependent Variable: Importance of climate change										

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4,790	,340		14,098	,000
	Hierarchy	-,269	,125	-,376	-2,147	,041
a. Dependent Variable: Importance of climate change						

Table 24: Correlations between cultural theory scales and feeling about the State Consejos Comunitarios

CORRELATIONS						
		1	2	3	4	5
1-Individualism	Correlation Coefficient	1				
2-Hierarchy	Correlation Coefficient	,332**	1			
3- Fatalism	Correlation Coefficient	,105	,297**	1		
4-Egalitarianism	Correlation Coefficient	-,042	-,038	,155	1	
5-Feeling about the State	Correlation Coefficient	,317*	-,216	-,024	,116	1
****. Correlation is significant at the 0.01 level (2-tailed).**						
***. Correlation is significant at the 0.05 level (2-tailed).**						

Table 25: Regression individualism and feeling about the State

Model Summary					
R	R Square	Adjusted R Square	Std. Error of the Estimate	Std. Error of the Estimate	Durbin-Watson
1	,317[a]	,101	,074	1,818	2,365
a. Variables predictoras: (Constante), Individualism					
b. Variable dependiente: Feeling about the State					

Coeficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,493	2,084		-,236	,815
	Individualism	1,449	,743	,317	1,950	,059
a. Variable dependiente: Feeling about the State						

Table 26: Correlations between cultural theory scales and feeling about the State Santiago Comaltepec

CORRELATIONS							
			1	2	3	4	5
	1-Individualism	Correlation Coefficient	1,000				
	2-Hierarchy	Correlation Coefficient	,021	1,000			
	3-Fatalism	Correlation Coefficient	-,196	-,039	1,000		
	4-Egalitarianism	Correlation Coefficient	,266	,158	,163	1,000	
	5-Feeling about the State	Correlation Coefficient	,129	,122	,528**	,174	1,000
****. Correlation is significant at the 0.01 level (1-tailed).**							

Table 27: Regression fatalism and feeling about the State

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,528[a]	,279	,251	,496	2,150
a. Predictors: (Constant), Fatalism					
b. Dependent Variable: Feeling about the State					

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,396	,339		4,118	,000
	Fatalism	,703	,222	,528	3,170	,004
a. Dependent Variable: Feeling abotu the State						

Table 28 Correlations between cultural theory scales and feeling about the State Joint Databases

Correlations						
		1	2	3	4	5
	1-Individualism	Correlation Coefficient	1,000				
	2-Hierarchy	Correlation Coefficient	,447**	1,000			
	3-Fatalism	Correlation Coefficient	,211	,292*	1,000		
	4-Egalitarianism	Correlation Coefficient	-,079	-,100	,035	1,000	
	5-Feeling about the State	Correlation Coefficient	,106	,202	,119	-,186	1,000
****. Correlation is significant at the 0.01 level (2-tailed).**							
***. Correlation is significant at the 0.05 level (2-tailed).**							

Table 29: Correlation Matrix cultural theory scales and dealing with climate change in current situation Consejos Comunitarios

CORRELATIONS						
		1	2	3	4	5
1-Individualism	Correlation Coefficient	1,000				
2-Hierarchy	Correlation Coefficient	,437**	1,000			
3-Fatalism	Correlation Coefficient	,134	,237*	1,000		
4-Egalitarianism	Correlation Coefficient	-,109	-,104	,101	1,000	
5-Current Situtation	Correlation Coefficient	-,054	,253	,090	-,108	1,000
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Table 30: Correlation Matrix cultural theory scales and dealing with climate change in current situation Santiago Comaltepec

CORRELATIONS						
		1	2	3	4	5
1-Individualism	Correlation Coefficient	1,000				
2-Hierarchy	Correlation Coefficient	,097	1,000			
3-Fatalism	Correlation Coefficient	-,015	-,229	1,000		
3Egalitarianism	Correlation Coefficient	,219	,124	,114	1,000	
5-Current Situtation	Correlation Coefficient	-,168	,206	,247	-,008	1,000
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Table 31 Correlation between cultural theory scales and dealing with climate change in current situation joint data bases

CORRELATIONS						
		1	2	3	4	5
1-Individualism	Correlation Coefficient	1,000				
2-Hierarchy	Correlation Coefficient	,447**	1,000			
3-Fatalism	Correlation Coefficient	,211	,292*	1,000		
4-Egalitarianism	Correlation Coefficient	-,079	-,100	,035	1,000	
5-Current situation	Correlation Coefficient	-,090	,165	-,081	-,162	1,000
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Catastrophic potential

Table 32 Correlations between cultural theory scales and catastrophic potential joint databases

CORRELATIONS							
			1	2	3	4	5
	1- Catastrophic potential	Correlation Coefficient	1,000				
	2- Individualism	Correlation Coefficient	-,090	1,000			
	3- Hierarchy	Correlation Coefficient	-,218	,447**	1,000		
	4- Fatalism	Correlation Coefficient	-,317**	,211	,292*	1,000	
	5- Egalitarianism	Correlation Coefficient	,278*	-,079	-,100	,035	1,000
***. Correlation is significant at the 0.05 level (2-tailed).**							
****. Correlation is significant at the 0.01 level (2-tailed).**							

Table 33: Correlations between cultural theory scales and catastrophic potential Consejos Comunitarios

CORRELATIONS							
			1	2	3	4	5
	1-Individualism	Correlation Coefficient	1,000				
	2-Hierarchy	Correlation Coefficient	,437**	1,000			
	3-Fatalism	Correlation Coefficient	,134	,237*	1,000		
	4-Egalitarianism	Correlation Coefficient	-,109	-,104	,101	1,000	
	5-Catastrophic potential	Correlation Coefficient	-,161	-,110	-,347**	,295**	1,0
***. Correlation is significant at the 0.05 level (2-tailed).**							
****. Correlation is significant at the 0.01 level (2-tailed).**							

Table 34 Correlations between cultural theory scales and catastrophic potential Santiago Comaltepec

CORRELATIONS							
			1	2	3	4	5
Spearman's rho	1-Individualism	Correlation Coefficient	1,000				
	2-Hierarchy	Correlation Coefficient	,097	1,000			
	3-Fatalism	Correlation Coefficient	-,015	-,229	1,000		
	4-Egalitarianism	Correlation Coefficient	,219	,124	,114	1,000	,
	5-Catastrophic potential	Correlation Coefficient	-,108	,234	-,528**	,114	1,000
****. Correlation is significant at the 0.01 level (1-tailed).**							

Harm to future generations

Table 35 Correlations between cultural theory scales and harm to future generations Santiago Comaltepec

Correlations							
			1	2	3	4	5
	1-Individualism	Correlation Coefficient	1,000				.
	2-Hierarchy	Correlation Coefficient	,097	1,000			.
	3-Fatalism	Correlation Coefficient	-,015	-,229	1,000		.
	4-Egalitarianism	Correlation Coefficient	,219	,124	,114	1,000	.
	5-Future generations	Correlation Coefficient	.	.	.	.	.
***. Correlation is significant at the 0.05 level (2-tailed).**							
****. Correlation is significant at the 0.01 level (2-tailed).**							

Table 36: Correlations between cultural theory scales and harm to future generations Consejos Comunitarios

Correlaciones							
			1	2	3	4	5
Rho de Spearman	1-Individualism	Coeficiente de correlación	1,000	,437**	,134	-,109	.
	2-Hierarchy	Coeficiente de correlación	,437**	1,000	,237*	-,104	.
	3-Fatalism	Coeficiente de correlación	,134	,237*	1,000	,101	.
	4-Egalitarianism	Coeficiente de correlación	-,109	-,104	,101	1,000	.
	5-Future generations	Coeficiente de correlación	.	.	.	.	.
***. Correlation is significant at the 0.05 level (2-tailed).**							
****. Correlation is significant at the 0.01 level (2-tailed).**							

Lack of knowledge to those exposed

Table 37 Correlation between cultural theory scales and knowledge to those exposed Consejos Comunitarios

Correlaciones						
		1	2	3	4	5
1- Individualism	Coeficiente de correlación	1,000	,437**	,134	-,109	-,238
2-Hierarchy	Coeficiente de correlación	,437**	1,000	,237*	-,104	-,025
3-Fatalism	Coeficiente de correlación	,134	,237*	1,000	,101	-,159
4-Egalitarianism	Coeficiente de correlación	-,109	-,104	,101	1,000	-,170
5-Lack of knowledge to those exposed	Coeficiente de correlación	-,238	-,025	-,159	-,170	1,000
****. La correlación es significativa al nivel 0,01 (unilateral).**						
***. La correlación es significativa al nivel 0,05 (unilateral).**						

Table 38 Correlation between cultural theory scales and knowledge to those exposed joint databases

Correlations[c]						
		1	2	3	4	5
1- Individualism	Correlation Coefficient	1,000				
2- Hierarchy	Correlation Coefficient	,441**	1,000			
3- Fatalism	Correlation Coefficient	,199	,263*	1,000		
4- Egalitarianism	Correlation Coefficient	-,076	-,104	,034	1,000	
5- Lack of knowledge to those exposed	Correlation Coefficient	-,004	-,165	,097	-,157	1,000
****. Correlation is significant at the 0.01 level (2-tailed).**						
***. Correlation is significant at the 0.05 level (2-tailed).**						
c. Listwise N = 68						

Table 39: Correlation between cultural theory scales and knowledge to those exposed Consejos Comunitarios

Correlations							
			1	2	3	4	5
	1- Individualism	Correlation Coefficient	1,000	,097	-,015	,219	,096
	2- Hierarchy	Correlation Coefficient	,097	1,000	-,229	,124	-,040
	3- Fatalism	Correlation Coefficient	-,015	-,229	1,000	,114	,437**
	4- Egalitarianism	Correlation Coefficient	,219	,124	,114	1,000	,154
	5- Lack of knowledge to those exposed	Correlation Coefficient	,096	-,040	,437**	,154	1,000
****. Correlation is significant at the 0.01 level (1-tailed).**							

Lack of knowledge to scientists

Table 40: Mann Whitney test Cultural theory and lack of knowledge to scientist I joint databases

Ranks				
	There is disagreement among scientist about consequences of climate change	N	Mean Rank	Sum of Ranks
Individualism	No	48	33,66	1615,50
	Yes	20	36,53	730,50
	Total	68		
Hierarchy	No	48	33,70	1617,50
	Yes	20	36,43	728,50
	Total	68		
Fatalism	No	48	33,58	1612,00
	Yes	20	36,70	734,00
	Total	68		
Egalitarianism	No	48	33,00	1584,00
	Yes	20	38,10	762,00
	Total	68		
	Test Statistics[a]			
	Individualism	Hierarchy	Fatalism	Egalitarianism
Mann-Whitney U	439,500	441,500	436,000	408,000
Wilcoxon W	1615,500	1617,500	1612,000	1584,000
Z	-,552	-,523	-,594	-,981
Asymp. Sig. (2-tailed)	,581	,601	,552	,327
Exact Sig. (2-tailed)	,586	,606	,558	,331
Exact Sig. (1-tailed)	,293	,303	,279	,166
Point Probability	,002	,002	,002	,002
a. Grouping Variable: Existe desacuerdo entre los científicos sobre las consecuencias del cambio climático				

Table 41: Mann Whitney test Cultural theory and lack of knowledge to scientist I Consejos Comunitarios

Ranks				
	There is disagreement among scientist about consequences of climate change	N	Mean Rank	Sum of Ranks
Individualism	No	25	17,48	437,00
	Yes	11	20,82	229,00
	Total	36		
Hierarchy	No	25	19,32	483,00
	Yes	11	16,64	183,00
	Total	36		
Fatalism	No	25	18,52	463,00
	Yes	11	18,45	203,00
	Total	36		
Egalitarianism	No	25	16,58	414,50
	Yes	11	22,86	251,50
	Total	36		

Test Statistics[a]				
	Individualism	Hierarchy	Fatalism	Egalitarianism
Mann-Whitney U	112,000	117,000	137,000	89,500
Wilcoxon W	437,000	183,000	203,000	414,500
Z	-,903	-,719	-,017	-1,689
Asymp. Sig. (2-tailed)	,366	,472	,986	,091
Exact Sig. (2-tailed)	,396	,498	1,000	,100
a. Grouping Variable: Existe desacuerdo entre los científicos sobre las consecuencias del cambio climático				
b Not corrected for ties..				

Table 42: Mann Whitney test Cultural theory and lack of knowledge to scientist I Santiago Comaltepec

Ranks				
	There is disagreement among scientist about consequences of climate change	N	Mean Rank	Sum of Ranks
Individualism	No	23	16,26	374,00
	Yes	7	13,00	91,00
	Total	30		
Hierarchy	No	23	14,70	338,00
	Yes	7	18,14	127,00
	Total	30		
Fatalism	No	23	15,52	357,00
	Yes	7	15,43	108,00
	Total	30		
Egalitarianism	No	23	15,85	364,50
	Yes	7	14,36	100,50
	Total	30		

Test Statistics[a]				
	Individualism	Hierarchy	Fatalism	Egalitarianism
Mann-Whitney U	63,000	62,000	80,000	72,500
Wilcoxon W	91,000	338,000	108,000	100,500
Z	-,868	-,919	-,025	-,397
Asymp. Sig. (2-tailed)	,386	,358	,980	,691
Exact Sig. [2*(1-tailed Sig.)]	,413	,386	1,000	,701
Exact Sig. (2-tailed)	,401	,373	,990	,710
Exact Sig. (1-tailed)	,200	,185	,495	,353
Point Probability	,006	,004	,010	,012
a. Grouping Variable: Existe desacuerdo entre los científicos sobre las consecuencias del cambio climático				
b. Not corrected for ties.				

Table 43: Mann Whitney test Cultural theory scales and lack of knowledge to scientists II joint databases

Ranks				
	There is disagreement among scientist about causes of climate change	N	Mean Rank	Sum of Ranks
Individualism	No	50	32,77	1638,50
	Yes	18	39,31	707,50
	Total	68		
Hierarchy	No	50	35,27	1763,50
	Yes	18	32,36	582,50
	Total	68		
Fatalism	No	50	34,89	1744,50
	Yes	18	33,42	601,50
	Total	68		
Egalitarianism	No	50	34,10	1705,00
	Yes	18	35,61	641,00
	Total	68		
	Test Statistics[a]			
	Individualism	Hierarchy	Fatalism	Egalitarianism
Mann-Whitney U	363,500	411,500	430,500	430,000
Wilcoxon W	1638,500	582,500	601,500	1705,000
Z	-1,218	-,540	-,272	-,281
Asymp. Sig. (2-tailed)	,223	,589	,786	,778
Exact Sig. (2-tailed)	,227	,595	,790	,783
Exact Sig. (1-tailed)	,113	,297	,395	,391
Point Probability	,001	,002	,003	,003
a. Grouping Variable: There is disagreement among scientist about causes of climate change				

Table 44: Cultural theory scales and lack of knowledge to scientists II Consejos Comunitarios

Ranks				
	There is disagreement among scientist about causes of climate change	N	Mean Rank	Sum of Ranks
Individualism	No	26	18,17	472,50
	Yes	10	19,35	193,50
	Total	36		
Hierarchy	No	26	18,15	472,00
	Yes	10	19,40	194,00
	Total	36		
Fatalism	No	26	18,77	488,00
	Yes	10	17,80	178,00
	Total	36		
Egalitarianism	No	26	17,60	457,50
	Yes	10	20,85	208,50
	Total	36		

TEST STATISTICS[A]				
	Individualism	Hierarchy	Fatalism	Egalitarianism
Mann-Whitney U	121,500	121,000	123,000	106,500
Wilcoxon W	472,500	472,000	178,000	457,500
Z	-,310	-,325	-,248	-,850
Asymp. Sig. (2-tailed)	,757	,745	,804	,395
Exact Sig. [2*(1-tailed Sig.)]	,768[b]	,768[b]	,821[b]	,413[b]
Exact Sig. (2-tailed)	,767	,758	,814	,403
Exact Sig. (1-tailed)	,385	,379	,407	,201
Point Probability	,009	,010	,008	,003
a. Grouping Variable: There is disagreement among scientist about causes of climate change				
b. Not corrected for ties..				

Table 45: Mann Whitney test Cultural theory scales and lack of knowledge to scientists II Santiago Comaltepec

RANKS				
	There is disagreement among scientist about causes of climate change	N	Mean Rank	Sum of Ranks
Individualism	No	22	14,75	324,50
	Yes	8	17,56	140,50
	Total	30		
Hierarchy	No	22	16,43	361,50
	Yes	8	12,94	103,50
	Total	30		
Fatalism	No	22	17,77	391,00
	Yes	8	9,25	74,00
	Total	30		
Egalitarianism	No	22	15,77	347,00
	Yes	8	14,75	118,00
	Total	30		

TEST STATISTICS[a]				
	Individualism	Hierarchy	Fatalism	Egalitarianism
Mann-Whitney U	71,500	67,500	38,000	82,000
Wilcoxon W	324,500	103,500	74,000	118,000
Z	-,783	-,974	-2,369	-,285
Asymp. Sig. (2-tailed)	,434	,330	,018	,776
Exact Sig. [2*(1-tailed Sig.)]	,447[b]	,344[b]	,018[b]	,801[b]
Exact Sig. (2-tailed)	,449	,342	,016	,790
Exact Sig. (1-tailed)	,224	,171	,008	,396
Point Probability	,007	,006	,001	,008
a. Grouping Variable: Existe desacuerdo entre los científicos sobre las causas del cambio climático				
b. Not corrected for ties.				

Table 46: Mann Whitney test Cultural theory scales and lack of knowledge to scientists III joint databases

RANKS				
	The majority of scientists think that climate change is not occurring	N	Mean Rank	Sum of Ranks
Individualism	No	65	34,60	2249,00
	Yes	3	32,33	97,00
	Total	68		
Hierarchy	No	65	34,60	2249,00
	Yes	3	32,33	97,00
	Total	68		
Fatalism	No	65	34,02	2211,50
	Yes	3	44,83	134,50
	Total	68		
Egalitarianism	No	65	35,15	2284,50
	Yes	3	20,50	61,50
	Total	68		
	Test Statistics[a]			
	Individualism	Hierarchy	Fatalism	Egalitarianism
Mann-Whitney U	91,000	91,000	66,500	55,500
Wilcoxon W	97,000	97,000	2211,500	61,500
Z	-,197	-,196	-,929	-1,269
Asymp. Sig. (2-tailed)	,844	,845	,353	,204
Exact Sig. [2*(1-tailed Sig.)]	,866[b]	,866[b]	,372[b]	,222[b]
Exact Sig. (2-tailed)	,852	,875	,374	,238
Exact Sig. (1-tailed)	,432	,437	,189	,128
Point Probability	,019	,016	,006	,039

a. Grouping Variable The majority of scientists think that climate change is not occurring
b. Not corrected for ties.

Table 47: Mann Whitney test Cultural theory scales and lack of knowledge to scientists III Consejos Comunitarios

Ranks				
	The majority of scientists think that climate change is not occurring	N	Mean Rank	Sum of Ranks
Individualism	No	34	18,25	620,50
	Yes	2	22,75	45,50
	Total	36		
Hierarchy	No	34	18,57	631,50
	Yes	2	17,25	34,50
	Total	36		
Fatalism	No	34	19,01	646,50
	Yes	2	9,75	19,50
	Total	36		
Egalitarianism	No	34	18,62	633,00
	Yes	2	16,50	33,00
	Total	36		

Test Statistics[a]				
	Individualism	Hierarchy	Fatalism	Egalitarianism
Mann-Whitney U	25,500	31,500	16,500	30,000
Wilcoxon W	620,500	34,500	19,500	33,000
Z	-,605	-,176	-1,214	-,283
Asymp. Sig. (2-tailed)	,545	,860	,225	,777
Exact Sig. [2*(1-tailed Sig.)]	,578[b]	,863[b]	,257[b]	,813[b]
Exact Sig. (2-tailed)	,632	,849	,271	,838
Exact Sig. (1-tailed)	,310	,457	,148	,433
Point Probability	,041	,070	,032	,076
Grouping Variable The majority of scientists think that climate change is not occurring				
b. Not corrected for ties.				

Table 48: Mann Whitney test Cultural theory scales and lack of knowledge to scientists III Santiago Comaltepec

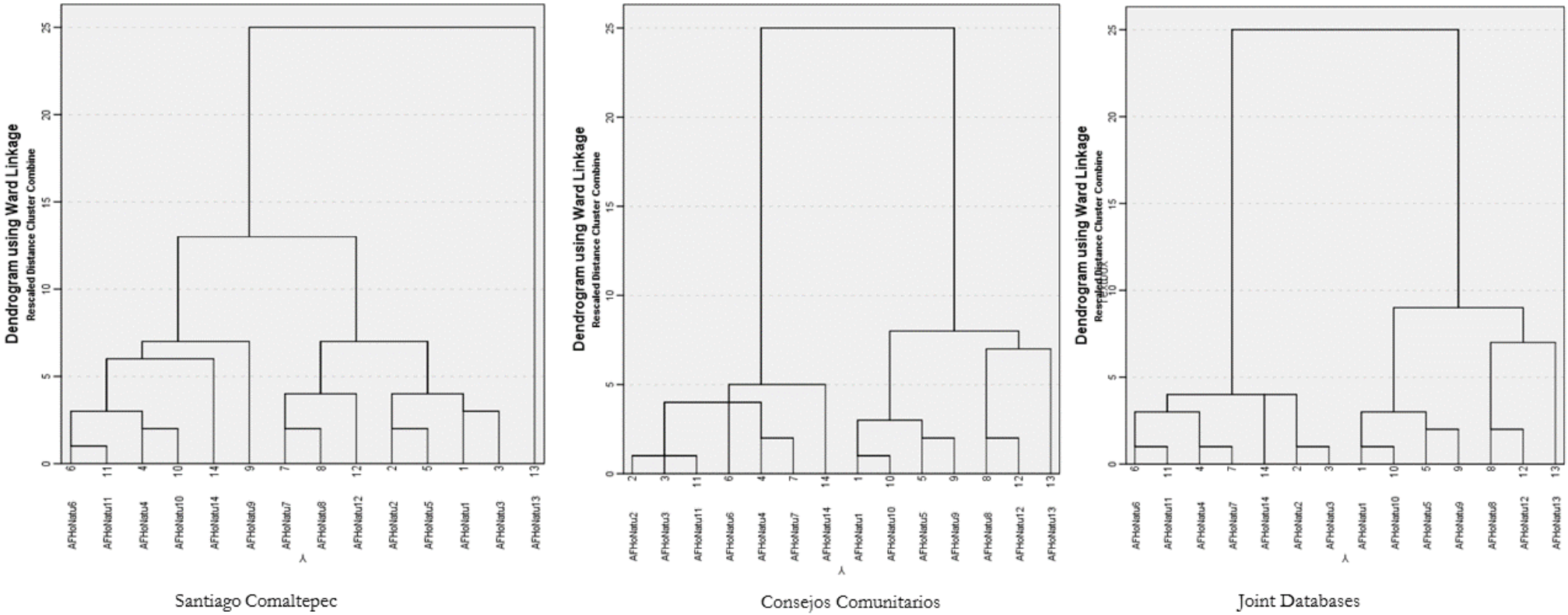
Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of IndividualistMEAN is the same across categories of La mayor parte de los cientificos piensan que el cambio climático no está ocurriendo.	Independent-Samples Mann-Whitney U Test	.	Unable to compute .
2	The distribution of HierarchicalMEAN is the same across categories of La mayor parte de los cientificos piensan que el cambio climático no está ocurriendo.	Independent-Samples Mann-Whitney U Test	.	Unable to compute .
3	The distribution of FatalistMEAN is the same across categories of La mayor parte de los cientificos piensan que el cambio climático no está ocurriendo.	Independent-Samples Mann-Whitney U Test	.	Unable to compute .
4	The distribution of EgalitarianMEAN is the same across categories of La mayor parte de los cientificos piensan que el cambio climático no está ocurriendo.	Independent-Samples Mann-Whitney U Test	.	Unable to compute .

Asymptotic significances are displayed. The significance level is ,05.

Appendix 5: Identifying the influence of NEP on perceiving climate change

Figure 1: Hierarchical cluster analysis for NEP scale for Santiago Comaltepec, Consejos Comunitarios and joint databases



Santiago Comaltepec

Consejos Comunitarios

Joint Databases

Table 1: Reliability for New Environmental Paradigm: Santiago Comaltepec

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,731	,748	13

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Humans have the right to modify the natural environment to suit their needs	42,63	10,268	,269	.	,725
When humans interfere with nature it often produces disastrous consequences	42,38	8,839	,754	.	,666
Humans are severely abusing the environment	42,63	9,411	,551	.	,691
The balance of nature is strong enough to cope with the impacts of modern industrial nations	42,13	10,125	,524	.	,704
Humans were meant to rule over the rest of nature	42,25	8,786	,885	.	,656
If things continue on their present course, we will soon experience a major ecological catastrophe	42,25	10,500	,238	.	,727
The balance of nature is very delicate and easily upset	42,38	8,839	,754	.	,666
We are approaching the limit of the number of people the earth can support	42,50	9,143	,619	.	,682
Human ingenuity will insure that we do not make the earth unlivable	42,63	11,696	-,151	.	,769
Plants and animals have as much right as humans to exist	42,25	10,500	,238	.	,727
Despite our special abilities humans are still subject to the laws of nature	42,38	9,125	,389	.	,713
The earth is like a spaceship with very limited room and resources	43,38	9,696	,254	.	,735
Humans will eventually learn enough about how nature works to be able to control it	42,25	12,500	-,393	.	,785

Table 2: Confirmatory PCA for New Environmental Paradigm Santiago Comaltepec

TOTAL VARIANCE EXPLAINED						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,370	24,073	24,073	3,370	24,073	24,073
2	2,296	16,402	40,475			
3	1,667	11,909	52,383			
4	1,463	10,453	62,837			
5	1,227	8,767	71,604			
6	,827	5,910	77,515			
7	,796	5,684	83,199			
8	,598	4,269	87,468			
9	,483	3,452	90,920			
10	,416	2,975	93,895			
11	,330	2,356	96,251			
12	,270	1,931	98,182			
13	,205	1,467	99,648			
14	,049	,352	100,000			
Extraction Method: Principal Component Analysis.						

Table 3: Reliability for New Environmental Paradigm: Consejos Comunitarios

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,546	,493	14

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Humans have the right to modify the natural environment to suit their needs	35,08	16,314	,512	,803	,453
When humans interfere with nature it often produces disastrous consequences	34,85	20,855	-,046	,720	,565
Humans are severely abusing the environment	34,69	20,302	,024	,592	,559
The balance of nature is strong enough to cope with the impacts of modern industrial nations	34,38	17,766	,341	,567	,498
Humans were meant to rule over the rest of nature	35,42	17,774	,290	,689	,507
If things continue on their present course, we will soon experience a major ecological catastrophe	34,65	19,435	,057	,494	,564
The balance of nature is very delicate and easily upset	34,65	17,835	,419	,562	,488
We are approaching the limit of the number of people the earth can support	35,77	18,665	,184	,445	,532
Human ingenuity will insure that we do not make the earth unlivable	35,85	18,615	,334	,529	,507
Plants and animals have as much right as humans to exist	35,38	16,326	,459	,850	,462
Despite our special abilities humans are still subject to the laws of nature	34,46	22,258	-,304	,677	,596
The earth is like a spaceship with very limited room and resources	35,27	20,045	,023	,660	,565
Humans will eventually learn enough about how nature works to be able to control it	36,15	19,095	,121	,339	,547
Humans have the right to modify the natural environment to suit their needs	34,88	16,586	,337	,769	,492

Table 4: Confirmatory PCA for New Environmental Paradigm Consejos Comunitarios

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,328
Bartlett's Test of Sphericity	Approx. Chi-Square	124,870
	df	91
	Sig.	,011

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,370	24,073	24,073	3,370	24,073	24,073
2	2,296	16,402	40,475			
3	1,667	11,909	52,383			
4	1,463	10,453	62,837			
5	1,227	8,767	71,604			
6	,827	5,910	77,515			
7	,796	5,684	83,199			
8	,598	4,269	87,468			
9	,483	3,452	90,920			
10	,416	2,975	93,895			
11	,330	2,356	96,251			
12	,270	1,931	98,182			
13	,205	1,467	99,648			
14	,049	,352	100,000			
Extraction Method: Principal Component Analysis.						

Table 5: Reliability for New Environmental Paradigm joint databases

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,788	,764	14

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Humans have the right to modify the natural environment to suit their needs	38,47	32,773	,488	,734	,768
When humans interfere with nature it often produces disastrous consequences	38,25	35,871	,290	,499	,783
Humans are severely abusing the environment	38,19	37,512	,061	,581	,798
The balance of nature is strong enough to cope with the impacts of modern industrial nations	37,84	34,717	,352	,572	,779
Humans were meant to rule over the rest of nature	38,66	30,168	,624	,711	,752
If things continue on their present course, we will soon experience a major ecological catastrophe	38,00	35,935	,214	,379	,789
The balance of nature is very delicate and easily upset	38,06	35,028	,387	,575	,777
We are approaching the limit of the number of people the earth can support	38,97	30,547	,589	,670	,756
Human ingenuity will insure that we do not make the earth unlivable	39,09	31,120	,687	,749	,750
Plants and animals have as much right as humans to exist	38,56	28,835	,702	,830	,742
Despite our special abilities humans are still subject to the laws of nature	37,94	38,060	,009	,319	,799
The earth is like a spaceship with very limited room and resources	38,59	32,894	,417	,618	,774
Humans will eventually learn enough about how nature works to be able to control it	39,44	34,383	,292	,593	,785
Humans have the right to modify the natural environment to suit their needs	38,22	33,789	,350	,575	,780

Table 6: Confirmatory PCA for New Environmental Paradigm joint databases

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,554
Bartlett's Test of Sphericity	Approx. Chi-Square	181,788
	df	91
	Sig.	,000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,086	29,183	29,183	4,086	29,183	29,183
2	2,129	15,205	44,388			
3	1,744	12,459	56,847			
4	1,378	9,842	66,689			
5	1,125	8,036	74,725			
6	,709	5,067	79,792			
7	,668	4,773	84,565			
8	,564	4,031	88,596			
9	,504	3,603	92,199			
10	,405	2,896	95,095			
11	,273	1,949	97,044			
12	,178	1,274	98,318			
13	,150	1,073	99,391			
14	,085	,609	100,000			
Extraction Method: Principal Component Analysis.						

Table 7: Individual scores for NEP scale

	Consejos Comunitarios	Mean scores(1-4)	Mean (14-56)	Santiago Comaltepc	Mean scores(1-4)	Mean (14-56)
	1	3,14285714	44	1	3,443295739	48,20614035
	2	2,84928571	39,89	2	3,529761905	49,41666667
	3	2,58785714	36,23	3	3,601190476	50,41666667
	4	2,35714286	33	4	3,229010025	45,20614035
	5	2,71428571	38	5	3,229010025	45,20614035
	6	2,72	38,08	6	3,571428571	50
	7	2,78571429	39	7	3,297142857	46,16
	8	2,28571429	32	8	3,458333333	48,41666667
	9	2,42857143	34	9	3,029761905	42,41666667
	10	2,71428571	38	10	3,529761905	49,41666667
	11	2,78571429	39	11	3,458333333	48,41666667
	12	2,5	35	12	3,443295739	48,20614035
	13	2,67	37,38	13	3,138979592	43,94571429
	14	2,85714286	40	14	3,571428571	50
	15	2,595	36,33	15	3,785714286	53
	16	2,63857143	36,94	16	3,857142857	54
	17	2,66714286	37,34	17	3,220206366	45,08288912
	18	2,80928571	39,33	18	3,44	48,16
	19	2,42857143	34	19	3,22817734	45,19448276
	20	2,57142857	36	20	3,714285714	52
	22	2,78571429	39	21	3,214285714	45
	23	3	42	22	2,886904762	40,41666667
	24	2,78571429	39	23	3,371867168	47,20614035
	25	3,07142857	43	24	3,657581454	51,20614035
	26	2,85714286	40	25	3,371867168	47,20614035
	27	2,78571429	39	26	3,642857143	51
	28	2,92857143	41	27	3,214285714	45
	29	2,595	36,33	28	3,229010025	45,20614035
	30	2,85714286	40	29	3,729010025	52,20614035
	31	3,14285714	44	30	3,371867168	47,20614035
	32	3,07142857	43			
	33	2,85714286	40			
	34	3,14285714	44			
	35	2,28571429	32			
	36	3,07142857	43			
	37	3,14285714	44			
	38	2,64285714	37			
	39	2,57142857	36			
	40	2,14428571	30,02			

Table 8: *t*-test country

Group Statistics					
	Country	N	Mean	Std. Deviation	Std. Error Mean
Environmental attitudes (NEP index)	Colombia	40	2,7463	,26602	,04206
	Mexico	29	3,4146	,23354	,04337

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Environmental attitudes (NEP index)	Equal variances assumed	,280	,598	-10,832	67	,000	-,66827	,06169	-,79141	-,54512
	Equal variances not assumed			-11,061	64,487	,000	-,66827	,06041	-,78894	-,54759

Table 9: ANOVA test age

Test of Homogeneity of Variances			
Sustituidas medias			
Levene Statistic	df1	df2	Sig.
,149	2	66	,861

ANOVA								
Environmental attitudes (NEP index)								
			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		,372	2	,186	1,073	,348
	Linear Term	Unweighted	,110	1	,110	,634	,429
		Weighted	,041	1	,041	,235	,630
		Deviation	,331	1	,331	1,912	,171
	Quadratic Term	Unweighted	,331	1	,331	1,912	,171
		Weighted	,331	1	,331	1,912	,171
Within Groups			11,423	66	,173		
Total			11,795	68			

Table 10: ANOVA test education

Test of Homogeneity of Variances			
Environmental attitudes (NEP index)			
Levene Statistic	df1	df2	Sig.
,630	2	65	,536

ANOVA							
Environmental attitudes (NEP index)							
			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		2,161	2	1,081	7,343	,001
	Linear Term	Unweighted	,329	1	,329	2,237	,140
		Weighted	,361	1	,361	2,451	,122
		Deviation	1,800	1	1,800	12,234	,001
	Quadratic Term	Unweighted	1,800	1	1,800	12,234	,001
		Weighted	1,800	1	1,800	12,234	,001
Within Groups			9,566	65	,147		
Total			11,727	67			

Multiple Comparisons							
Dependent Variable: Environmental attitudes (NEP index)							
	(I) Educational Level	(J) Educational Level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Primary	Middle	,22862	,11453	,121	-,0461	,5033
		Higher	-,19406	,12974	,300	-,5053	,1171
	Middle	Primary	-,22862	,11453	,121	-,5033	,0461
		Higher	-,42267*	,11241	,001	-,6923	-,1531
	Higher	Primary	,19406	,12974	,300	-,1171	,5053
		Middle	,42267*	,11241	,001	,1531	,6923
***. The mean difference is significant at the 0.05 level.**							

Environmental attitudes (NEP index)				
	Educational level	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a,b]	Middle	33	2,8619	
	Primary	17	3,0905	3,0905
	Higher	18		3,2846
	Sig.		,142	,241
Ryan-Einot-Gabriel-Welsch Range	Middle	33	2,8619	
	Primary	17	3,0905	3,0905
	Higher	18		3,2846
	Sig.		,087	,145
Means for groups in homogeneous subsets are displayed.				
a. Uses Harmonic Mean Sample Size = 20,735.				

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 11: ANOVA test ideology

Test of Homogeneity of Variances			
Environmental attitudes (NEP index)			
Levene Statistic	df1	df2	Sig.
,394	3	32	,758

ANOVA							
Environmental attitudes (NEP index)							
			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		1,911	3	,637	5,707	,003
	Linear Term	Unweighted	1,495	1	1,495	13,394	,001
		Weighted	1,374	1	1,374	12,316	,001
		Deviation	,536	2	,268	2,403	,107
	Quadratic Term	Unweighted	,055	1	,055	,489	,489
		Weighted	,234	1	,234	2,094	,158
		Deviation	,302	1	,302	2,711	,109
Within Groups			3,571	32	,112		
Total			5,482	35			

Multiple Comparisons							
Dependent Variable: Environmental attitudes (NEP index)							
	(I) Ideology	(J) Ideology	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Left	Centre-left	-,06898	,13459	,956	-,4336	,2957
		Centre-right	,39890	,18018	,141	-,0893	,8871
		Right	,49983*	,16954	,029	,0405	,9592
	Centre-left	Left	,06898	,13459	,956	-,2957	,4336
		Centre-right	,46788	,17404	,052	-,0037	,9394
		Right	,56881*	,16300	,007	,1272	1,0104
	Centre-right	Left	-,39890	,18018	,141	-,8871	,0893
		Centre-left	-,46788	,17404	,052	-,9394	,0037
		Right	,10093	,20228	,959	-,4471	,6490
	Right	Left	-,49983*	,16954	,029	-,9592	-,0405
		Centre-left	-,56881*	,16300	,007	-1,0104	-,1272
		Centre-right	-,10093	,20228	,959	-,6490	,4471
***. The mean difference is significant at the 0.05 level.**							

Environmental attitudes (NEP index)					
	Ideology	N	Subset for alpha = 0.05		
			1	2	3
Tukey HSD[a,b]	Right	6	2,8426		
	Centre-right	5	2,9435	2,9435	
	Left	11		3,3424	3,3424
	Centre-left	14			3,4114
	Sig.		,935	,114	,978
Ryan-Einot-Gabriel-Welsch Range[c]	Right	6	2,8426		
	Centre-right	5	2,9435	2,9435	
	Left	11		3,3424	
	Centre-left	14		3,4114	
	Sig.		,868	,084	
Means for groups in homogeneous subsets are displayed.					
a. Uses Harmonic Mean Sample Size = 7,561.					
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.					
c. Critical values are not monotonic for these data. Substitutions have been made to ensure monotonicity. Type I error is therefore smaller.					

Table 12: *t*-test gender

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Environmental attitudes (NEP index)	Equal variances assumed	,683	,411	-2,508	67	,015	-,24667	,09835	-,44298	-,05036
	Equal variances not assumed			-2,470	54,961	,017	-,24667	,09988	-,44684	-,04650

Origin and occurrence of climate change

Table 13: Homogeneity Chi-SquarePro ecological homogeneity chi-Square climate change is occurring and it is caused by human actions

Crosstab					
Country: Total					
			Climate change is occurring and it is caused by human actions		Total
			No	Yes	
ProEcological	No	Count	18	23	41
		% within category	43,9%	56,1%	100,0%
		% within question	75,0%	52,3%	60,3%
		% of Total	26,5%	33,8%	60,3%
	Yes	Count	6	21	27
		% within category	22,2%	77,8%	100,0%
		% within question	25,0%	47,7%	39,7%
		% of Total	8,8%	30,9%	39,7%
Total		Count	24	44	68
		% within ProEcological	35,3%	64,7%	100,0%
		% within question	100,0%	100,0%	100,0%
		% of Total	35,3%	64,7%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,880[d]	1	,348	1,000	,538	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	1,261	1	,262	1,000	,538	
	Fisher's Exact Test				1,000	,538	
	Linear-by-Linear Association	,857[e]	1	,355	1,000	,538	,538
	N of Valid Cases	39					
Mexico	Pearson Chi-Square	,873[f]	1	,350	,585	,485	
	Continuity Correction[b]	,033	1	,856			
	Likelihood Ratio	1,479	1	,224	,585	,485	
	Fisher's Exact Test				1,000	,485	
	Linear-by-Linear Association	,843[g]	1	,359	,585	,485	,485
	N of Valid Cases	29					
Total	Pearson Chi-Square	3,351[a]	1	,067	,077	,057	
	Continuity Correction[b]	2,468	1	,116			
	Likelihood Ratio	3,467	1	,063	,077	,057	
	Fisher's Exact Test				,077	,057	
	Linear-by-Linear Association	3,301[c]	1	,069	,077	,057	,040
	N of Valid Cases	68					

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 9,53.

b. Computed only for a 2x2 table

c. The standardized statistic is 1,817.

d. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,46.

e. The standardized statistic is ,926.

f. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,62.

g. The standardized statistic is -,918.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,150	,348	1,000
		Cramer's V	,150	,348	1,000
		Contingency Coefficient	,149	,348	1,000
	N of Valid Cases		39		
Mexico	Nominal by Nominal	Phi	-,173	,350	,585
		Cramer's V	,173	,350	,585
		Contingency Coefficient	,171	,350	,585
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	,222	,067	,077
		Cramer's V	,222	,067	,077
		Contingency Coefficient	,217	,067	,077
	N of Valid Cases		68		
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 14: Homogeneity Chi-Square Mid ecological climate change is occurring and it is caused by human actions

Crosstab					
Country: Total					
			Climate change is occurring and it is caused by human actions		Total
			No	Yes	
MidEcological	No	Count	7	21	28
		% within category	25,0%	75,0%	100,0%
		% within question	29,2%	47,7%	41,2%
		% of Total	10,3%	30,9%	41,2%
	Yes	Count	17	23	40
		% within category	42,5%	57,5%	100,0%
		% within question	70,8%	52,3%	58,8%
		% of Total	25,0%	33,8%	58,8%
Total		Count	24	44	68
		% within category	35,3%	64,7%	100,0%
		% within question	100,0%	100,0%	100,0%
		% of Total	35,3%	64,7%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,013[d]	1	,911	1,000	,717	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,013	1	,911	1,000	,717	
	Fisher's Exact Test				1,000	,717	
	Linear-by-Linear Association	,012[e]	1	,912	1,000	,717	,510
	N of Valid Cases	39					
Mexico	Pearson Chi-Square	,873[f]	1	,350	,585	,485	
	Continuity Correction[b]	,033	1	,856			
	Likelihood Ratio	1,479	1	,224	,585	,485	
	Fisher's Exact Test				1,000	,485	
	Linear-by-Linear Association	,843[g]	1	,359	,585	,485	,485
	N of Valid Cases	29					
Total	Pearson Chi-Square	2,209[a]	1	,137	,198	,109	
	Continuity Correction[b]	1,509	1	,219			
	Likelihood Ratio	2,259	1	,133	,198	,109	
	Fisher's Exact Test				,198	,109	
	Linear-by-Linear Association	2,176[c]	1	,140	,198	,109	,070
	N of Valid Cases	68					

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 9,88.

b. Computed only for a 2x2 table

c. The standardized statistic is -1,475.

d. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,92.

e. The standardized statistic is ,111.

f. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,62.

g. The standardized statistic is ,918.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,018	,911	1,000
		Cramer's V	,018	,911	1,000
		Contingency Coefficient	,018	,911	1,000
	N of Valid Cases		39		
Mexico	Nominal by Nominal	Phi	,173	,350	,585
		Cramer's V	,173	,350	,585
		Contingency Coefficient	,171	,350	,585
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	-,180	,137	,198
		Cramer's V	,180	,137	,198
		Contingency Coefficient	,177	,137	,198
	N of Valid Cases		68		
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 15: Homogeneity Chi-Square Pro ecological climate change is occurring and it is caused by natural changes in the climate system

Crosstab					
Country Total					
			Climate change is occurring and it is caused by natural changes in the climate system		Total
			No	Yes	
ProEcological	No	Count	37	4	41
		% within category	90,2%	9,8%	100,0%
		% within question	59,7%	66,7%	60,3%
		% of Total	54,4%	5,9%	60,3%
	Yes	Count	25	2	27
		% within category	92,6%	7,4%	100,0%
		% within question	40,3%	33,3%	39,7%
		% of Total	36,8%	2,9%	39,7%
Total		Count	62	6	68
		% within category	91,2%	8,8%	100,0%
		% within question	100,0%	100,0%	100,0%
		% of Total	91,2%	8,8%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,117[d]	1	,732	1,000	,897	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,219	1	,639	1,000	,897	
	Fisher's Exact Test				1,000	,897	
	Linear-by-Linear Association	,114[e]	1	,735	1,000	,897	,897
	N of Valid Cases	39					
Mexico	Pearson Chi-Square	,248[f]	1	,619	1,000	,800	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,454	1	,501	1,000	,800	
	Fisher's Exact Test				1,000	,800	
	Linear-by-Linear Association	,239[g]	1	,625	1,000	,800	,800
	N of Valid Cases	29					
Total	Pearson Chi-Square	,112[a]	1	,738	1,000	,551	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,114	1	,736	1,000	,551	
	Fisher's Exact Test				1,000	,551	
	Linear-by-Linear Association	,110[c]	1	,740	1,000	,551	,325
	N of Valid Cases	68					

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 2,38.

b. Computed only for a 2x2 table

c. The standardized statistic is -,332.

d. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,10.

e. The standardized statistic is -,338.

f. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,21.

g. The standardized statistic is ,489.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	-,055	,732	1,000
		Cramer's V	,055	,732	1,000
		Contingency Coefficient	,055	,732	1,000
	N of Valid Cases		39		
Mexico	Nominal by Nominal	Phi	,092	,619	1,000
		Cramer's V	,092	,619	1,000
		Contingency Coefficient	,092	,619	1,000
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	-,041	,738	1,000
		Cramer's V	,041	,738	1,000
		Contingency Coefficient	,040	,738	1,000
	N of Valid Cases		68		
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 16: Homogeneity Chi-Square Mid ecological climate change is occurring and it is caused by natural changes in the climate system

Crosstab					
Country: Total					
			Climate change is occurring and it is caused by natural changes in the climate system		Total
			No	Yes	
Mid Ecological	No	Count	26	2	28
		% within category	92,9%	7,1%	100,0%
		% within question	41,9%	33,3%	41,2%
		% of Total	38,2%	2,9%	41,2%
	Yes	Count	36	4	40
		% within category	90,0%	10,0%	100,0%
		% within question	58,1%	66,7%	58,8%
		% of Total	52,9%	5,9%	58,8%
Total		Count	62	6	68
		% within category	91,2%	8,8%	100,0%
		% within question	100,0%	100,0%	100,0%
		% of Total	91,2%	8,8%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,241[d]	1	,624	1,000	,803	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,445	1	,505	1,000	,803	
	Fisher's Exact Test				1,000	,803	
	Linear-by-Linear Association	,235[e]	1	,628	1,000	,803	,803
	N of Valid Cases	39					
Mexico	Pearson Chi-Square	,248[f]	1	,619	1,000	,800	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,454	1	,501	1,000	,800	
	Fisher's Exact Test				1,000	,800	
	Linear-by-Linear Association	,239[g]	1	,625	1,000	,800	,800
	N of Valid Cases	29					
Total	Pearson Chi-Square	,167[a]	1	,683	1,000	,519	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,171	1	,679	1,000	,519	
	Fisher's Exact Test				1,000	,519	
	Linear-by-Linear Association	,165[c]	1	,685	1,000	,519	,316
	N of Valid Cases	68					

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 2,47.

b. Computed only for a 2x2 table

c. The standardized statistic is ,406.

d. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,21.

e. The standardized statistic is ,485.

f. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,21.

g. The standardized statistic is -,489.

Table 17: Homogeneity Chi-Square Pro ecological climate change is occurring and it is caused by both human activities and natural changes in the climate system

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	-,055	,732	1,000
		Cramer's V	,055	,732	1,000
		Contingency Coefficient	,055	,732	1,000
	N of Valid Cases		39		
Mexico	Nominal by Nominal	Phi	,092	,619	1,000
		Cramer's V	,092	,619	1,000
		Contingency Coefficient	,092	,619	1,000
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	-,041	,738	1,000
		Cramer's V	,041	,738	1,000
		Contingency Coefficient	,040	,738	1,000
	N of Valid Cases		68		
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Crosstab					
Country: Total					
			Climate change is occurring and it is caused by both human activities and natural changes in the climate system		Total
			No	Yes	
ProEcological	No	Count	29	12	41
		% within category	70,7%	29,3%	100,0%
		% within question	54,7%	80,0%	60,3%
		% of Total	42,6%	17,6%	60,3%
	Yes	Count	24	3	27
		% within category	88,9%	11,1%	100,0%
		% within question	45,3%	20,0%	39,7%
		% of Total	35,3%	4,4%	39,7%
Total		Count	53	15	68
		% within category	77,9%	22,1%	100,0%
		% within question	100,0%	100,0%	100,0%
		% of Total	77,9%	22,1%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,456[d]	1	,499	1,000	,692	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,747	1	,387	1,000	,692	
	Fisher's Exact Test				1,000	,692	
	Linear-by-Linear Association	,444[e]	1	,505	1,000	,692	,692
	N of Valid Cases	39					
Mexico	Pearson Chi-Square	,386[f]	1	,534	1,000	,712	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,694	1	,405	1,000	,712	
	Fisher's Exact Test				1,000	,712	
	Linear-by-Linear Association	,373[g]	1	,541	1,000	,712	,712
	N of Valid Cases	29					
Total	Pearson Chi-Square	3,122[a]	1	,077	,133	,068	
	Continuity Correction[b]	2,155	1	,142			
	Likelihood Ratio	3,352	1	,067	,086	,068	
	Fisher's Exact Test				,133	,068	
	Linear-by-Linear Association	3,076[c]	1	,079	,133	,068	,052
	N of Valid Cases	68					

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5,96.

b. Computed only for a 2x2 table

c. The standardized statistic is -1,754.

d. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,31.

e. The standardized statistic is -,667.

f. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,31.

g. The standardized statistic is ,611.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	-,108	,499	1,000
		Cramer's V	,108	,499	1,000
		Contingency Coefficient	,108	,499	1,000
	N of Valid Cases		39		
Mexico	Nominal by Nominal	Phi	,115	,534	1,000
		Cramer's V	,115	,534	1,000
		Contingency Coefficient	,115	,534	1,000
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	-,214	,077	,133
		Cramer's V	,214	,077	,133
		Contingency Coefficient	,210	,077	,133
	N of Valid Cases		68		
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 18: Homogeneity chi-Square Mid ecological climate change is occurring and it is caused by both human activities and natural changes in the climate system

Crosstab					
Country: Total					
			Climate change is occurring and it is caused by both human activities and natural changes in the climate systems		Total
			No	Yes	
MidEcological	No	Count	25	3	28
		% within MidEcological	89,3%	10,7%	100,0%
		% within El CC esta ocurriendo y esta causado por actividades humanas y cambios naturales	47,2%	20,0%	41,2%
		% of Total	36,8%	4,4%	41,2%
	Yes	Count	28	12	40
		% within MidEcological	70,0%	30,0%	100,0%
		% within question	52,8%	80,0%	58,8%
		% of Total	41,2%	17,6%	58,8%
Total		Count	53	15	68
		% within MidEcological	77,9%	22,1%	100,0%
		% within quesiton	100,0%	100,0%	100,0%
		% of Total	77,9%	22,1%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,937[d]	1	,333	,563	,474	
	Continuity Correction[b]	,033	1	,856			
	Likelihood Ratio	1,518	1	,218	,563	,474	
	Fisher's Exact Test				1,000	,474	
	Linear-by-Linear Association	,913[e]	1	,339	,563	,474	,474
	N of Valid Cases	39					
Mexico	Pearson Chi-Square	,386[f]	1	,534	1,000	,712	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,694	1	,405	1,000	,712	
	Fisher's Exact Test				1,000	,712	
	Linear-by-Linear Association	,373[g]	1	,541	1,000	,712	,712
	N of Valid Cases	29					
Total	Pearson Chi-Square	3,563[a]	1	,059	,078	,053	
	Continuity Correction[b]	2,530	1	,112			
	Likelihood Ratio	3,823	1	,051	,078	,053	
	Fisher's Exact Test				,078	,053	
	Linear-by-Linear Association	3,511[c]	1	,061	,078	,053	,041
	N of Valid Cases	68					

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 6,18.
b. Computed only for a 2x2 table
c. The standardized statistic is 1,874.
d. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,62.
e. The standardized statistic is ,955.
f. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,31.
g. The standardized statistic is -,611.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,155	,333	,563
		Cramer's V	,155	,333	,563
		Contingency Coefficient	,153	,333	,563
	N of Valid Cases		39		
Mexico	Nominal by Nominal	Phi	-,115	,534	1,000
		Cramer's V	,115	,534	1,000
		Contingency Coefficient	,115	,534	1,000
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	,229	,059	,078
		Cramer's V	,229	,059	,078
		Contingency Coefficient	,223	,059	,078
	N of Valid Cases		68		
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 19: Homogeneity Chi-Square Anti ecological climate change is occurring and it is caused by both human activities and natural changes in the climate system

Crosstab					
Country: Total					
			Climate change is occurring and it is caused by both human activities and natural changes in the climate systems		Total
			No	Yes	
AntiEcological	No	Count	52	15	67
		% within AntiEcological	77,6%	22,4%	100,0%
		% within question	98,1%	100,0%	98,5%
		% of Total	76,5%	22,1%	98,5%
	Yesi	Count	1	0	1
		% within AntiEcological	100,0%	0,0%	100,0%
		% within question	1,9%	0,0%	1,5%
		% of Total	1,5%	0,0%	1,5%
Total		Count	53	15	68
		% within AntiEcological	77,9%	22,1%	100,0%
		% within question	100,0%	100,0%	100,0%
		% of Total	77,9%	22,1%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,456[d]	1	,499	1,000	,692	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,747	1	,387	1,000	,692	
	Fisher's Exact Test				1,000	,692	
	Linear-by-Linear Association	,444[e]	1	,505	1,000	,692	,692
	N of Valid Cases	39					
Mexico	Pearson Chi-Square	.[f]					
	N of Valid Cases	29					
Total	Pearson Chi-Square	,287[a]	1	,592	1,000	,779	
	Continuity Correction[b]	,000	1	1,000			
	Likelihood Ratio	,503	1	,478	1,000	,779	
	Fisher's Exact Test				1,000	,779	
	Linear-by-Linear Association	,283[c]	1	,595	1,000	,779	,779
	N of Valid Cases	68					

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,22.
b. Computed only for a 2x2 table
c. The standardized statistic is -,532.
d. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,31.
e. The standardized statistic is -,667.
f. No statistics are computed because AntiEcological is a constant.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	-,108	,499	1,000
		Cramer's V	,108	,499	1,000
		Contingency Coefficient	,108	,499	1,000
	N of Valid Cases		39		
Mexico	Nominal by Nominal	Phi	.[c]		
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	-,065	,592	1,000
		Cramer's V	,065	,592	1,000
		Contingency Coefficient	,065	,592	1,000
	N of Valid Cases		68		

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. No statistics are computed because AntiEcological is a constant.

Importance of climate change and concern about depletion of natural resources

Table 20: Pro ecological Homogeneity Chi Square importance of climate change

Crosstab							
Country Total							
			Importance of climate change				Total
			Not at all important	Somewhat important	Very important	Extremely important	
ProEcological	No	Count	1	12	23	6	42
		% within ProEcological	2,4%	28,6%	54,8%	14,3%	100,0%
		% within question	100,0%	100,0%	46,9%	85,7%	60,9%
		% of Total	1,4%	17,4%	33,3%	8,7%	60,9%
	Yes	Count	0	0	26	1	27
		% within ProEcological	0,0%	0,0%	96,3%	3,7%	100,0%
		% within question	0,0%	0,0%	53,1%	14,3%	39,1%
		% of Total	0,0%	0,0%	37,7%	1,4%	39,1%
Total		Count	1	12	49	7	69
		% within ProEcological	1,4%	17,4%	71,0%	10,1%	100,0%
		% within ImporCC	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	1,4%	17,4%	71,0%	10,1%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,839[c]	3	,840	1,000		
	Likelihood Ratio	1,217	3	,749	1,000		
	Fisher's Exact Test	3,328			1,000		
	Linear-by-Linear Association	,106[d]	1	,744	1,000	,675	,550
	N of Valid Cases	40					
Mexico	Pearson Chi-Square	3,642[e]	1	,056	,200	,200	
	Continuity Correction[f]	,497	1	,481			
	Likelihood Ratio	2,259	1	,133	,200	,200	
	Fisher's Exact Test				,200	,200	
	Linear-by-Linear Association	3,517[g]	1	,061	,200	,200	,192
	N of Valid Cases	29					
Total	Pearson Chi-Square	14,164[a]	3	,003	,001		
	Likelihood Ratio	18,881	3	,000	,000		
	Fisher's Exact Test	15,138			,000		
	Linear-by-Linear Association	2,607[b]	1	,106	,121	,075	,045
	N of Valid Cases	69					

a. 5 cells (62,5%) have expected count less than 5. The minimum expected count is ,39.
b. The standardized statistic is 1,615.
c. 6 cells (75,0%) have expected count less than 5. The minimum expected count is ,03.
d. The standardized statistic is ,326.
e. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,21.
f. Computed only for a 2x2 table
g. The standardized statistic is -1,875.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,145	,840	1,000
		Cramer's V	,145	,840	1,000
		Contingency Coefficient	,143	,840	1,000
	N of Valid Cases		40		
Mexico	Nominal by Nominal	Phi	-,354	,056	,200
		Cramer's V	,354	,056	,200
		Contingency Coefficient	,334	,056	,200
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	,453	,003	,001
		Cramer's V	,453	,003	,001
		Contingency Coefficient	,413	,003	,001
	N of Valid Cases		69		

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 21: Mid ecological Homogeneity Chi Square importance of climate change

Crosstab							
Country: Total							
			Importance of climate change				Total
			Not at all important	Somewhat important	Very important	Extremely important	
MidEcological	No	Count	0	1	26	1	28
		% within MidEcological	0,0%	3,6%	92,9%	3,6%	100,0%
		% within question	0,0%	8,3%	53,1%	14,3%	40,6%
		% of Total	0,0%	1,4%	37,7%	1,4%	40,6%
	Si	Count	1	11	23	6	41
		% within MidEcological	2,4%	26,8%	56,1%	14,6%	100,0%
		% within question	100,0%	91,7%	46,9%	85,7%	59,4%
		% of Total	1,4%	15,9%	33,3%	8,7%	59,4%
Total		Count	1	12	49	7	69
		% within MidEcological	1,4%	17,4%	71,0%	10,1%	100,0%
		% within ImporCC	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	1,4%	17,4%	71,0%	10,1%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,606[c]	3	,895	1,000		
	Likelihood Ratio	,861	3	,835	1,000		
	Fisher's Exact Test	2,298			1,000		
	Linear-by-Linear Association	,218[d]	1	,640	1,000	,473	,338
	N of Valid Cases	40					
Mexico	Pearson Chi-Square	3,642[e]	1	,056	,200	,200	
	Continuity Correction[f]	,497	1	,481			
	Likelihood Ratio	2,259	1	,133	,200	,200	
	Fisher's Exact Test				,200	,200	
	Linear-by-Linear Association	3,517[g]	1	,061	,200	,200	,192
	N of Valid Cases	29					
Total	Pearson Chi-Square	11,031[a]	3	,012	,006		
	Likelihood Ratio	12,820	3	,005	,005		
	Fisher's Exact Test	10,942			,006		
	Linear-by-Linear Association	1,591[b]	1	,207	,253	,145	,075
	N of Valid Cases	69					

a. 5 cells (62,5%) have expected count less than 5. The minimum expected count is ,41.
b. The standardized statistic is -1,261.
c. 6 cells (75,0%) have expected count less than 5. The minimum expected count is ,05.
d. The standardized statistic is ,467.
e. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,21.
f. Computed only for a 2x2 table
g. The standardized statistic is 1,875.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,123	,895	1,000
		Cramer's V	,123	,895	1,000
		Contingency Coefficient	,122	,895	1,000
	N of Valid Cases		40		
Mexico	Nominal by Nominal	Phi	,354	,056	,200
		Cramer's V	,354	,056	,200
		Contingency Coefficient	,334	,056	,200
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	,400	,012	,006
		Cramer's V	,400	,012	,006
		Contingency Coefficient	,371	,012	,006
	N of Valid Cases		69		
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 22: Anti ecological: Homogeneity Chi Square importance of climate change

Crosstab							
Country Total							
			Importance of climate change				Total
			Not at all important	Somewhat important	Very important	Extremely important	
AntiEcological	No	Count	1	11	49	7	68
		% within AntiEcological	1,5%	16,2%	72,1%	10,3%	100,0%
		% within question	100,0%	91,7%	100,0%	100,0%	98,6%
		% of Total	1,4%	15,9%	71,0%	10,1%	98,6%
	Yes	Count	0	1	0	0	1
		% within AntiEcological	0,0%	100,0%	0,0%	0,0%	100,0%
		% within question	0,0%	8,3%	0,0%	0,0%	1,4%
		% of Total	0,0%	1,4%	0,0%	0,0%	1,4%
Total		Count	1	12	49	7	69
		% within AntiEcological	1,4%	17,4%	71,0%	10,1%	100,0%
		% within question	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	1,4%	17,4%	71,0%	10,1%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	2,393[c]	3	,495	,450		
	Likelihood Ratio	2,468	3	,481	,450		
	Fisher's Exact Test	4,540			,450		
	Linear-by-Linear Association	,957[d]	1	,328	,450	,325	,300
	N of Valid Cases	40					
Mexico	Pearson Chi-Square	.[e]					
	N of Valid Cases	29					
Total	Pearson Chi-Square	4,820[a]	3	,185	,290		
	Likelihood Ratio	3,570	3	,312	,290		
	Fisher's Exact Test	6,642			,290		
	Linear-by-Linear Association	1,992[b]	1	,158	,290	,188	,174
	N of Valid Cases	69					

a. 5 cells (62,5%) have expected count less than 5. The minimum expected count is ,01.

b. The standardized statistic is -1,411.

c. 6 cells (75,0%) have expected count less than 5. The minimum expected count is ,03.

d. The standardized statistic is -,978.

e. No statistics are computed because AntiEcological is a constant.

Symmetric Measures					
Country			Value	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,245	,495	,450
		Cramer's V	,245	,495	,450
		Contingency Coefficient	,238	,495	,450
	N of Valid Cases		40		
Mexico	Nominal by Nominal	Phi	.[c]		
	N of Valid Cases		29		
Total	Nominal by Nominal	Phi	,264	,185	,290
		Cramer's V	,264	,185	,290
		Contingency Coefficient	,256	,185	,290
	N of Valid Cases		69		

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. No statistics are computed because AntiEcological is a constant.

Table 23: Correlation between importance of climate change and environmental attitude

Correlations				
			1	2
	1-Importance of climate change	Correlation Coefficient	1,000	
	2-NEP scale	Correlation Coefficient	,294*	1,000
***. Correlation is significant at the 0.05 level (2-tailed).**				

Table 24: Regression between importance of climate change and environmental attitude joint data bases

Model Summary[b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,306[a]	,094	,080	,605	,094	6,929	1	67	,011	2,331
a. Predictors: (Constant), Sustituidas medias										
b. Dependent Variable: ImporCC										

Coefficients[a]									
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	2,480	,538		4,607	,000			
	NEP scale	,464	,176	,306	2,632	,011	,306	,306	,306
a. Dependent Variable: ImporCC									

Table 25: Correlation between importance of climate change and environmental attitude Consejos Comunitarios

Correlations				
			1	2
	1- Environmental attitudes (NEP index)	Correlation Coefficient Sig. (2-tailed)	1,000	
	2- Importance of climate change	Correlation Coefficient Sig. (2-tailed)	,218	1,000

Table 26: Correlations between importance of climate change and environmental attitude Santiago Comaltepec

Correlations				
			1	2
	1-Importance of climate change	Correlation Coefficient	1,000	
	2-Environmental attitudes (NEP index)	Correlation Coefficient	,186	1,000

Table 27: Correlations between environmental attitudes and concern about depletion of natural resources joint databases

Correlations				
			1	2
	1- Environmental attitudes (NEP index)	Correlation Coefficient	1,000	
	2-Concern about depletion of natural resources	Correlation Coefficient	-,200	1,000

Table 28: Correlations between environmental attitudes and concern about depletion of natural resources Santiago Comaltepec

Correlations				
			1	2
	1- Environmental attitudes (NEP index)	Correlation Coefficient	1,000	
	2-Concern about depletion of natural resources	Correlation Coefficient	-,139	1,000

Table 29: Correlations between environmental attitudes and concern about depletion of natural resources Consejos Comunitarios

Correlations				
			1	2
	- Environmental attitudes (NEP index)	Coeficiente de correlación	1,000	
	2-Concern about depletion of natural resources	Coeficiente de correlación	,086	1,000

Environmental attitudes and behaviors change and cultural bias

Table 30: ANOVA test preferences for either protecting the environment or having more jobs joint database

Test of Homogeneity of Variances			
Environmental attitudes (NEP index)			
Levene Statistic	df1	df2	Sig.
,021	2	66	,979

ANOVA							
Environmental attitudes (NEP index)							
			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		1,743	2	,871	5,721	,005
	Linear Term	Weighted	1,743	1	1,743	11,442	,001
		Deviation	,000	1	,000	,000	,988
	Quadratic Term	Weighted	,000	1	,000	,000	,988
Within Groups			10,052	66	,152		
Total			11,795	68			

Multiple Comparisons							
Dependent Variable: Environmental attitudes (NEP index)							
	(I) Question	(J) Question	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Protect the environment	Balance	-,29407*	,09738	,010	-,5276	-,0606
		Depend on situation	-,43762	,20569	,092	-,9308	,0555
	Balance	Protect the environment	,29407*	,09738	,010	,0606	,5276
		Depend on situation	-,14355	,20815	,770	-,6426	,3555
	Depend on situation	Protect the environment	,43762	,20569	,092	-,0555	,9308
		Balance	,14355	,20815	,770	-,3555	,6426
***. The mean difference is significant at the 0.05 level.**							

Table 31: ANOVA test preferences for either protecting the environment or having more jobs Santiago Comaltepec

Test of Homogeneity of Variances			
Environmental attitudes (NEP index)			
Levene Statistic	df1	df2	Sig.
1,701	2	27	,202

ANOVA							
Environmental attitudes (NEP index)							
			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		1,637	2	,818	5,989	,007
	Linear Term	Weighted	,906	1	,906	6,627	,016
		Deviation	,731	1	,731	5,352	,029
Within Groups			3,689	27	,137		
Total			5,326	29			

Multiple Comparisons							
Environmental attitudes (NEP index)							
	(I) Question	(J) Question	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Protect the environment	Balance	-,55775*	,16344	,006	-,9630	-,1525
		Depend on situation	-,29297	,23170	,427	-,8674	,2815
	Balance	Protect the environment	,55775*	,16344	,006	,1525	,9630
		Depend on situation	,26477	,20336	,406	-,2394	,7690
	Depend on situation	Protect the environment	,29297	,23170	,427	-,2815	,8674
		Balance	-,26477	,20336	,406	-,7690	,2394
***. The mean difference is significant at the 0.05 level.**							

Table 32: ANOVA test preferences for either protecting the environment or having more jobs Consejos Comunitarios

Test of Homogeneity of Variances			
Environmental attitudes (NEP index)			
Levene Statistic	gl1	gl2	Sig.
,192[a]	1	36	,664
a. Los grupos con un único caso se ignorarán al calcular la prueba de homogeneidad de la varianza para NEPMEDIA.			

ANOVA							
Environmental attitudes (NEP index)							
			Sum of Squares	df	Mean Square	F	Sig.
Inter-grupos	(Combined)		,085	2	,042	,638	,534
	Linear Term	Weighted	,072	1	,072	1,086	,304
		Deviation	,013	1	,013	,190	,666
Intra-grupos			2,389	36	,066		
Total			2,473	38			

Table 33: Correlation between cultural theory and NEP index joint data bases

Correlations						
		1	2	3	4	5
1-Individualism	Correlation Coefficient	1,000				
2- Hierarchy	Correlation Coefficient	,426**	1,000			
3- Fatalism	Correlation Coefficient	,117	,245*	1,000		
4- Egalitarianism	Correlation Coefficient	-,079	-,105	,088	1,000	
5-Environmental attitudes (NEP index)	Correlation Coefficient	-,367**	-,560**	-,314**	,343**	1,000
****. Correlation is significant at the 0.01 level (2-tailed).**						
***. Correlation is significant at the 0.05 level (2-tailed).**						

Table 34: Correlations between environmental attitudes and cultural bias Consejos Comunitarios

Correlaciones						
		1	2	3	4	5
1- Environmental attitudes (NEP index)	Correlation Coefficient	1,000	-,189	-,321*	-,522**	-,489**
	Sig. (1-tailed)	.	,124	,023	,000	,001
	N	39	39	39	39	39
2-Individualism	Correlation Coefficient	-,189	1,000	,330*	,071	,080
	Sig. (1-tailed)	,124	.	,020	,333	,315
	N	39	39	39	39	39
3-Hierarchy	Correlation Coefficient	-,321*	,330*	1,000	,241	,364*
	Sig. (1-tailed)	,023	,020	.	,070	,011
	N	39	39	39	39	39
4-Fatalism	Correlation Coefficient	-,522**	,071	,241	1,000	,514**
	Sig. (1-tailed)	,000	,333	,070	.	,000
	N	39	39	39	39	39
5-Egalitarianism	Correlation Coefficient	-,489**	,080	,364*	,514**	1,000
	Sig. (1-tailed)	,001	,315	,011	,000	.
	N	39	39	39	39	39
***. La correlación es significativa al nivel 0,05 (unilateral).**						
****. La correlación es significativa al nivel 0,01 (unilateral).**						

Table 35: Regression egalitarianism and environmental attitudes Consejos Comunitarios

Resumen del modelo[b]					
Model	R	R Square	Adjusted R square	Std. Error of the Estimate	Durbin-Watson
1	,439[a]	,192	,171	,23235	1,781
a. Variables predictoras: (Constante), Egalitarianism					
b. Variable dependiente: NEP Scale					

Coeficientes[a]						
Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3,888	,399		9,754	,000
	Egalitarian	-,363	,122	-,439	-2,970	,005
a. Variable dependiente: NEPScale						

Table 36: Regression fatalism and environmental attitudes Consejos Comunitarios

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,466[a]	,217	,196	,22876	1,683
a. Predictors: (Constant),:Fatalism					
b. Variable dependiente: Environmental attitudes (NEP index)					

Coeficientes[a]						
Modelo		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constante)	3,052	,113		27,017	,000
	Fatalism	-,177	,055	-,466	-3,204	,003
a. Variable dependiente: Environmental attitudes (NEP index)						

Table 37: Correlations between environmental attitudes and cultural bias Santiago Comaltepec

Correlations						
		1	2	3	4	5
1- Environmental attitudes (NEP index)	Correlation Coefficient	1,000				
2-Individualism	Correlation Coefficient	,101	1,000			
3-Hierarchy	Correlation Coefficient	,132	,097	1,000		
4-Fatalism	Correlation Coefficient	-,370*	-,015	-,229	1,000	
5-Egalitarianism	Correlation Coefficient	,024	,219	,124	,114	1,000
***. Correlation is significant at the 0.05 level (1-tailed).**						

Table 37: Regression fatalism and environmental attitudes Santiago Comaltepec

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,163[a]	,027	-,008	,43031	2,020
a. Predictors: (Constant), FatalistMEAN					
b. Dependent Variable: NEPIndex					

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3,517	,292		12,057	,000
	Fatalism	-,168	,192	-,163	-,875	,389
a. Dependent Variable: NEPIndex						

Appendix 6: Psychological distance of climate change and temporal discounting

Psychological distance dimensions and importance to climate change

Table 1: Correlations between psychological distance dimensions joint data bases

Correlations			1	2	3	4	5	6	7	8	9	10	11	12
1-	Your personally	Correlation Coefficient	1,000											
2-	Your family	Correlation Coefficient	,875**	1,000										
3-	Consejo comunitario/ Community	Correlation Coefficient	,808**	,920**	1,000									
4-	Colombians/ Mexicans	Correlation Coefficient	,535**	,636**	,703**	1,000								
5-	People in industrialized	Correlation Coefficient	,551**	,661**	,570**	,842**	1,000							
6-	People in non-industrialized countries	Correlation Coefficient	,788**	,757**	,828**	,703**	,570**	1,000	.	.				
7-	Future generations	Correlation Coefficient	.	.	.	.	.	.	.	.	.	.	.	.
8-	Plants and animals	Correlation Coefficient	.	.	.	.	.	.	.	.	.	.	.	.
9-	The forest	Correlation Coefficient	,350**	,396**	,418**	-,034	-,043	,418**	.	.	1,000			
10-	Autochthonous flora	Correlation Coefficient	,179	-,061	-,056	-,049	,216*	,242*	.	.	-,021	1,000		
11-	Autochthonous fauna	Correlation Coefficient	-,049	-,043	-,039	-,034	,347**	-,039	.	.	-,015	,702**	1,000	
12-	Pacific coast/ Sierra of Oaxaca	Correlation Coefficient	,357**	,190	,207*	-,060	,149	,449**	.	.	,586**	,798**	,560**	1,000

****. Correlation is significant at the 0.01 level (1-tailed).**
***. Correlation is significant at the 0.05 level (1-tailed).**

Table 2 PCA and Validity analysis for psychological distance variables

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,645
Bartlett's Test of Sphericity	Approx. Chi-Square	587,978
	df	21
	Sig.	,000

Rotated Component Matrix[a]		
	Component	
	1	2
Your personally	,848	,290
Your family	,839	,419
Consejo comunitario/ Community	,769	,576
Colombians/ Mexicans	,175	,972
People in industrialized	,149	,919
People in non-industrialized countries	,772	,538
Pacific coast/ Sierra of Oaxaca	,837	-,242
Extraction Method: Principal Component Analysis. **Rotation Method: Varimax with Kaiser Normalization.**		
a. Rotation converged in 3 iterations.		

Table 3: Reliability analysis psychological distance elements

Reliability Statistics	
Cronbach's Alpha	N of Items
,906	7

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Your personally	6,68	3,660	,749	,889
Your family	6,72	3,766	,863	,877
Consejo comunitario/ Community	6,72	3,547	,924	,868
Colombians/ Mexicans	6,75	4,095	,690	,896
People in industrialized	6,69	3,748	,590	,913
People in non-industrialized countries	6,72	3,578	,900	,871
Pacific coast/ Sierra of Oaxaca	6,78	4,578	,386	,921

Table 4 Correlation between importance to climate change and social psychological index

Correlations				
			1	2
Spearman's rho	1- Social and geographical perceived distance	Correlation Coefficient	1,000	
	2- Importance of climate change	Correlation Coefficient	-,255*	1,000
***. Correlation is significant at the 0.05 level (1-tailed).**				

Table 5: Regression analysis psychological distance and importance of climate change

	B	SE B	β
(Constant)	4.815	.406	
Psychological distance	-.868	.373	-.274

Table 6: Correlation between perceived social and geographical distance and concern about depletion of natural resources

Correlations				
			1	2
Spearman's rho	1-Social and geographical perceived distance	Correlation Coefficient		,025
	2-Concern about depletion of natural resources	Correlation Coefficient	,025	

Table 7: Relation between Catastrophic potential of climate change and psychological distance

Correlations			
		1	**2**
1-CatastrophicPotential	Correlation Coefficient	1	
2- Psychological distance	Correlation Coefficient	-,242*	1
***. Correlation is significant at the 0.05 level (2-tailed).**			

Table 8: Regression Analysis for psychological distance and catastrophic potential of climate change

Model Summary[b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,242[a]	,059	,045	,46687	,059	4,175	1	67	,045	1,726
a. Predictors: (Constant), Psychological distance										
b. Dependent Variable: CatastrophicPotential										

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3,814	,207		18,408	,000
	Psychological distance	-,366	,179	-,242	-2,043	,045
a. Dependent Variable: CatastrophicPotential						

Appendix 7: Scepticism and uncerntainty of climate change

Question to a scientist

Table 1: Fisher's exact test for when climate change will begin to harm people and country

Country * When will climate change begin to harm people? Crosstabulation					
			When will climate change begin to harm people?		Total
			No	Yes	
Country	Colombia	Count	27	11	38
		% within Country	71,1%	28,9%	100,0%
		% within question	52,9%	64,7%	55,9%
	Mexico	Count	24	6	30
		% within Country	80,0%	20,0%	100,0%
		% within question	47,1%	35,3%	44,1%
Total		Count	51	17	68
		% within Country	75,0%	25,0%	100,0%
		% within question	100,0%	100,0%	100,0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	,716[a]	1	,398	,574	,288	
Continuity Correction[b]	,318	1	,573			
Likelihood Ratio	,726	1	,394	,418	,288	
Fisher's Exact Test				,574	,288	
Linear-by-Linear Association	,705[c]	1	,401	,574	,288	,159
N of Valid Cases	68					
a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 7,50.						
b. Computed only for a 2x2 table						
c. The standardized statistic is -,840.						

Table 2: Fisher's exact test for who and what is causing climate change and country

Country*what or who is causing climate change? Crosstabulation					
			What or who is causing climate change?		Total
			No	Yes	
Country	Colombia	Count	29	9	38
		% within Country	76,3%	23,7%	100,0%
		% within question	51,8%	75,0%	55,9%
	Mexico	Count	27	3	30
		% within Country	90,0%	10,0%	100,0%
		% within question?	48,2%	25,0%	44,1%
Total		Count	56	12	68
		% within Country	82,4%	17,6%	100,0%
		% within question?	100,0%	100,0%	100,0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	2,160[a]	1	,142	,204	,124	
Continuity Correction[b]	1,321	1	,250			
Likelihood Ratio	2,268	1	,132	,204	,124	
Fisher's Exact Test				,204	,124	
Linear-by-Linear Association	2,128[c]	1	,145	,204	,124	,091
N of Valid Cases	68					

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5,29.

b. Computed only for a 2x2 table

c. The standardized statistic is -1,459.

Table 3: Fisher's exact test for what harm will do climate change and country

Country * What harm will do climate change Crosstabulation					
			what harm will do climate change		Total
			No	Yes	
Country	Colombia	Count	33	5	38
		% within Country	86,8%	13,2%	100,0%
		% within question	58,9%	41,7%	55,9%
	Mexico	Count	23	7	30
		% within Country	76,7%	23,3%	100,0%
		% within question	41,1%	58,3%	44,1%
Total		Count	56	12	68
		% within Country	82,4%	17,6%	100,0%
		% within question	100,0%	100,0%	100,0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1,194[a]	1	,274	,344	,219	
Continuity Correction[b]	,597	1	,440			
Likelihood Ratio	1,187	1	,276	,344	,219	
Fisher's Exact Test				,344	,219	
Linear-by-Linear Association	1,177[c]	1	,278	,344	,219	,140
N of Valid Cases	68					

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5,29.

b. Computed only for a 2x2 table

c. The standardized statistic is 1,085.

Appendix 8: Behaviour and climate change

Table 1: Homogeneity Chi-Square analysis "Thinking about nature when buying products" and country

Country * natureandbuying Crosstabulation					
			Thinking about nature when buying products		Total
			No	Yes	
Country	Colombia	Count	18	21	39
		% within country	46,2%	53,8%	100,0%
		% within question	100,0%	41,2%	56,5%
	Mexico	Count	0	30	30
		% within country	0,0%	100,0%	100,0%
		% within question	0,0%	58,8%	43,5%
Total		Count	18	51	69
		% within country	26,1%	73,9%	100,0%
		% within question	100,0%	100,0%	100,0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	18,733[a]	1	,000		
Continuity Correction[b]	16,416	1	,000		
Likelihood Ratio	25,373	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	18,462	1	,000		
N of Valid Cases	69				
a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 7,83.					
b. Computed only for a 2x2 table					

Table 2: Homogeneity Chi-Square test on "Thinking about nature when buying products" and age

Crosstabs Age * Thinking about nature when buying products * Country						
Country				Thinking about nature when buying products		Total
				No	Yes	
Colombia	Age	Young	Count	12	5	17
			% within category	70,6%	29,4%	100,0%
			% within question	66,7%	23,8%	43,6%
			% total	30,8%	12,8%	43,6%
		Middle-Aged	Count	4	11	15
			% within category	26,7%	73,3%	100,0%
			% within question	22,2%	52,4%	38,5%
			% total	10,3%	28,2%	38,5%
		Elder	Count	2	5	7
			% within category	28,6%	71,4%	100,0%
			% within question	11,1%	23,8%	17,9%
			% total	5,1%	12,8%	17,9%
	Total		Count	18	21	39
			% within category	46,2%	53,8%	100,0%
			% within question	100,0%	100,0%	100,0%
			% total	46,2%	53,8%	100,0%
Mexico	Age	Young	Count		10	10
			% within category		10,0	10,0
			% within question		100,0%	100,0%
			% total		33,3%	33,3%
			Count		33,3%	33,3%
		Middle-Aged	Count		15	15
			% within category		100,0%	100,0%
			% within question		50,0%	50,0%
			% total		50,0%	50,0%
		Elder	Count		5	5
			% within category		100,0%	100,0%
			% within question		16,7%	16,7%
			% total		16,7%	16,7%
	Total		Count		30	30
			% within category		100,0%	100,0%
			% within question		100,0%	100,0%
			% total		100,0%	100,0%
Total	Age	Young	Count	12	15	27

			% within category	44,4%	55,6%	100,0%
			% within question	66,7%	29,4%	39,1%
			% total	17,4%	21,7%	39,1%
		Middle-Aged	Count	4	26	30
			% within category	13,3%	86,7%	100,0%
			% within question	22,2%	51,0%	43,5%
			% total	5,8%	37,7%	43,5%
		Elder	Count	2	10	12
			% within category	16,7%	83,3%	100,0%
			% within question	11,1%	19,6%	17,4%
			% total	2,9%	14,5%	17,4%
	Total		Count	18	51	69
			% within category	26,1%	73,9%	100,0%
			% within question	100,0%	100,0%	100,0%
			% total	26,1%	73,9%	100,0%

Chi-Square Tests							
Country		Valor	gl	Sig. asintótica (bilateral)	Sig. exacta (bilateral)	Sig. exacta (unilateral)	Probabilidad en el punto
Colombia	Pearson Chi-Square	7,247[c]	2	,027	,030		
	Continuity Correction[b]	7,464	2	,024	,030		
	Likelihood Ratio	7,010			,030		
	Fisher's Exact Test	5,303[d]	1	,021	,030	,017	,012
	Linear-by-Linear Association	39					
Mexico	Pearson Chi-Square	.[e]					
	Continuity Correction[b]	30					
Total	Likelihood Ratio	7,802[a]	2	,020	,025		
	Fisher's Exact Test	7,737	2	,021	,039		
	Linear-by-Linear Association	7,281			,027		
	N of Valid Cases	5,299[b]	1	,021	,023	,015	,010
	Pearson Chi-Square	69					

a. 1 casillas (16,7%) tienen una frecuencia esperada inferior a 5. La frecuencia mínima esperada es 3,13.

b. El estadístico tipificado es 2,302.

c. 2 casillas (33,3%) tienen una frecuencia esperada inferior a 5. La frecuencia mínima esperada es 3,23.

d. El estadístico tipificado es 2,303.

e. No se calculará ningún estadístico porque ImpCOSAS es una constante.

Medidas simétricas					
Country			Valor	Sig. aproximada	Sig. exacta
Colombia	Nominal by nominal	Phi	,431	,027	,030
		Cramer's V	,431	,027	,030
		Pearson's R	,396	,027	,030
	N of Valid Cases		39		
Mexico	Nominal by nominal	Phi	.[c]		
	N of Valid Cases		30		
Total	Nominal by nominal	Phi	,336	,020	,025
		Cramer's V	,336	,020	,025
		Pearson's R	,319	,020	,025
	N of Valid Cases		69		
a. Asumiendo la hipótesis alternativa.					
b. Empleando el error típico asintótico basado en la hipótesis nula.					
c. No se calculará ningún estadístico porque ImpCOSAS es una constante.					

Table 3: Homogeneity Chi-Square "Authorities help participants to behave sustainable" and gender

Genero * authorities help participants * Country Crosstabulation						
Country				AUTCompNATRECOD		Total
				Si	No	
Colombia	Gender	Male	Count	12	9	21
			% within gender	57,1%	42,9%	100,0%
			% within question	85,7%	45,0%	61,8%
			% of Total	35,3%	26,5%	61,8%
		Femaler	Count	2	11	13
			% within gender	15,4%	84,6%	100,0%
			% within question	14,3%	55,0%	38,2%
			% of Total	5,9%	32,4%	38,2%
	Total		Count	14	20	34
			% within gender	41,2%	58,8%	100,0%
			% within question	100,0%	100,0%	100,0%
			% of Total	41,2%	58,8%	100,0%
Mexico	Gender	Male	Count	5	9	14
			% within gender	35,7%	64,3%	100,0%
			% within question	35,7%	75,0%	53,8%
			% of Total	19,2%	34,6%	53,8%
		Femaler	Count	9	3	12
			% within gender	75,0%	25,0%	100,0%
			% within question	64,3%	25,0%	46,2%

			% of Total	34,6%	11,5%	46,2%
	Total		Count	14	12	26
			% within gender	53,8%	46,2%	100,0%
			% within question	100,0%	100,0%	100,0%
			% of Total	53,8%	46,2%	100,0%
Total	Gender	Male	Count	17	18	35
			% within gender	48,6%	51,4%	100,0%
			% within question	60,7%	56,2%	58,3%
			% of Total	28,3%	30,0%	58,3%
		Femaler	Count	11	14	25
			% within gender	44,0%	56,0%	100,0%
			% within question	39,3%	43,8%	41,7%
			% of Total	18,3%	23,3%	41,7%
	Total		Count	28	32	60
			% within gender	46,7%	53,3%	100,0%
			% within question	100,0%	100,0%	100,0%
			% of Total	46,7%	53,3%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	5,781[d]	1	,016	,030	,018	
	Continuity Correction[b]	4,185	1	,041			
	Likelihood Ratio	6,225	1	,013	,030	,018	
	Fisher's Exact Test				,030	,018	
	Linear-by-Linear Association	5,611[e]	1	,018	,030	,018	,016
	N of Valid Cases	34					
Mexico	Pearson Chi-Square	4,013[f]	1	,045	,062	,053	
	Continuity Correction[b]	2,588	1	,108			
	Likelihood Ratio	4,144	1	,042	,062	,053	
	Fisher's Exact Test				,062	,053	
	Linear-by-Linear Association	3,858[g]	1	,049	,062	,053	,046
	N of Valid Cases	26					
Total	Pearson Chi-Square	,122[a]	1	,726	,796	,466	
	Continuity Correction[b]	,008	1	,930			
	Likelihood Ratio	,123	1	,726	,796	,466	
	Fisher's Exact Test				,796	,466	
	Linear-by-Linear Association	,120[c]	1	,729	,796	,466	,195
	N of Valid Cases	60					

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 11,67.

b. Computed only for a 2x2 table

c. The standardized statistic is ,347.

d. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5,35.

e. The standardized statistic is 2,369.

f. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5,54.

g. The standardized statistic is -1,964.

Symmetric Measures							
Country			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,412			,016	,030
		Cramer's V	,412			,016	,030
	Interval by Interval	Pearson's R	,412	,144	2,560	,015[c]	,030
	Ordinal by Ordinal	Spearman Correlation	,412	,144	2,560	,015[c]	,030
	N of Valid Cases		34				
Mexico	Nominal by Nominal	Phi	-,393			,045	,062
		Cramer's V	,393			,045	,062
	Interval by Interval	Pearson's R	-,393	,179	-2,093	,047[c]	,062
	Ordinal by Ordinal	Spearman Correlation	-,393	,179	-2,093	,047[c]	,062
	N of Valid Cases		26				
Total	Nominal by Nominal	Phi	,045			,726	,796
		Cramer's V	,045			,726	,796
	Interval by Interval	Pearson's R	,045	,129	,344	,732[c]	,796
	Ordinal by Ordinal	Spearman Correlation	,045	,129	,344	,732[c]	,796
	N of Valid Cases		60				

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Table 4: Homogeneity Chi-Square "Authorities help participants to behave sustainable" and age

Age * authorities help participants * Country Crosstabulation						
Pais				AUTCompNATRECOD		Total
				Yes	No	
Colombia	Age	Young	Count	6	9	15
			% within category	40,0%	60,0%	100,0%
			% within question	42,9%	45,0%	44,1%
			% total	17,6%	26,5%	44,1%
		Middle-Aged	Count	6	7	13
			% within category	46,2%	53,8%	100,0%
			% within question	42,9%	35,0%	38,2%
			% total	17,6%	20,6%	38,2%
		Elder	Count	2	4	6
			% within category	33,3%	66,7%	100,0%
			% within question	14,3%	20,0%	17,6%
			% total	5,9%	11,8%	17,6%
	Total		Count	14	20	34
			% within category	41,2%	58,8%	100,0%
			% within question	100,0%	100,0%	100,0%
			% total	41,2%	58,8%	100,0%
Mexico	Age	Young	Count	8	1	9
			% within category	88,9%	11,1%	100,0%
			% within question	57,1%	8,3%	34,6%
			% total	30,8%	3,8%	34,6%
		Middle-Aged	Count	4	9	13
			% within category	30,8%	69,2%	100,0%
			% total	15,4%	34,6%	50,0%
		Elder	Count	2	2	4
			% within category	50,0%	50,0%	100,0%
			% within question	14,3%	16,7%	15,4%
			% total	7,7%	7,7%	15,4%
	Total		Count	14	12	26
			% within category	53,8%	46,2%	100,0%
			% within question	100,0%	100,0%	100,0%
			% total	53,8%	46,2%	100,0%
Total	Age	Young	Count	14	10	24
			% within category	58,3%	41,7%	100,0%
			% within question	50,0%	31,2%	40,0%
			% total	23,3%	16,7%	40,0%

		Middle-Aged	Count	10	16	26
			% within category	38,5%	61,5%	100,0%
			% within question	35,7%	50,0%	43,3%
			% total	16,7%	26,7%	43,3%
		Elder	Count	4	6	10
			% within category	40,0%	60,0%	100,0%
			% within question	14,3%	18,8%	16,7%
			% total	6,7%	10,0%	16,7%
	Total		Count	28	32	60
			% within category	46,7%	53,3%	100,0%
			% within question	100,0%	100,0%	100,0%
			% total	46,7%	53,3%	100,0%

Chi-Square Tests

Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,294[c]	2	,863	,907		
	Likelihood Ratio	,296	2	,862	,907		
	Fisher's Exact Test	,382			1,000		
	Linear-by-Linear Association	,019[d]	1	,891	1,000	,540	,181
	N of Valid Cases	34					
Mexico	Pearson Chi-Square	7,257[e]	2	,027	,021		
	Likelihood Ratio	8,017	2	,018	,034		
	Fisher's Exact Test	7,262			,016		
	Linear-by-Linear Association	3,516[f]	1	,061	,087	,054	,041
	N of Valid Cases	26					
Total	Pearson Chi-Square	2,194[a]	2	,334	,373		
	Likelihood Ratio	2,203	2	,332	,373		
	Fisher's Exact Test	2,179			,373		
	Linear-by-Linear Association	1,545[b]	1	,214	,282	,144	,067
	N of Valid Cases	60					

a. 1 cells (16,7%) have expected count less than 5. The minimum expected count is 4,67.

b. The standardized statistic is 1,243.

c. 2 cells (33,3%) have expected count less than 5. The minimum expected count is 2,47.

d. The standardized statistic is ,136.

e. 4 cells (66,7%) have expected count less than 5. The minimum expected count is 1,85.

f. The standardized statistic is 1,875.

Symmetric Measures							
Country			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,093			,863	,907
		Cramer's V	,093			,863	,907
	Interval by Interval	Pearson's R	,024	,169	,134	,894[c]	1,000
	Ordinal by Ordinal	Spearman Correlation	,013	,170	,075	,941[c]	1,000
	N of Valid Cases		34				
Mexico	Nominal by Nominal	Phi	,528			,027	,021
		Cramer's V	,528			,027	,021
	Interval by Interval	Pearson's R	,375	,177	1,982	,059[c]	,087
	Ordinal by Ordinal	Spearman Correlation	,406	,180	2,178	,039[c]	,050
	N of Valid Cases		26				
Total	Nominal by Nominal	Phi	,191			,334	,373
		Cramer's V	,191			,334	,373
	Interval by Interval	Pearson's R	,162	,127	1,249	,217[c]	,282
	Ordinal by Ordinal	Spearman Correlation	,172	,128	1,326	,190[c]	,193
	N of Valid Cases		60				

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Table 5: Homogeneity Chi-Square "Protecting nature or having more jobs" and educational level

Educational Level * Protecting the environment or having more jobs * Country Crosstabulation							
Pais				**Protecting the environment or having more jobs**			**Total**
				Protect the environment	Balance	Depend on situation	
Colombia	Education	Primary	Count	6	2	0	8
			% within category	75,0%	25,0%	0,0%	100,0 %
			% within question	21,4%	20,0%	0,0%	20,5 %
			% of Total	15,4%	5,1%	0,0%	20,5 %
		Secondary	Count	18	7	1	26
			% within category	69,2%	26,9%	3,8%	100,0 %
			% within question	64,3%	70,0%	100,0%	66,7 %
			% of Total	46,2%	17,9%	2,6%	66,7 %
		Higher	Count	4	1	0	5
			% within category	80,0%	20,0%	0,0%	100,0 %
			% within question	14,3%	10,0%	0,0%	12,8 %
			% of Total	10,3%	2,6%	0,0%	12,8 %
	Total		Count	28	10	1	39
			% within category	71,8%	25,6%	2,6%	100,0 %
			% within question	100,0%	100,0%	100,0%	100,0 %
			% of Total	71,8%	25,6%	2,6%	100,0 %
Mexico	Education	Primary	Count	3	6	0	9
			% within category	33,3%	66,7%	0,0%	100,0 %
			% within question	42,9%	31,6%	0,0%	30,0 %

			% of Total	10,0%	20,0%	0,0%	30,0 %
		Secondary	Count	3	3	1	7
			% within category	42,9%	42,9%	14,3%	100,0 %
			% within question	42,9%	15,8%	25,0%	23,3 %
			% of Total	10,0%	10,0%	3,3%	23,3 %
		Higher	Count	1	10	3	14
			% within category	7,1%	71,4%	21,4%	100,0 %
			% within question	14,3%	52,6%	75,0%	46,7 %
			% of Total	3,3%	33,3%	10,0%	46,7 %
	Total		Count	7	19	4	30
			% within category	23,3%	63,3%	13,3%	100,0 %
			% within question	100,0%	100,0%	100,0%	100,0 %
			% of Total	23,3%	63,3%	13,3%	100,0 %
Total	Education	Primary	Count	9	8	0	17
			% within category	52,9%	47,1%	0,0%	100,0 %
			% within question	25,7%	27,6%	0,0%	24,6 %
			% of Total	13,0%	11,6%	0,0%	24,6 %
		Secondary	Count	21	10	2	33
			% within category	63,6%	30,3%	6,1%	100,0 %
			% within question	60,0%	34,5%	40,0%	47,8 %
			% of Total	30,4%	14,5%	2,9%	47,8 %
		Higher	Count	5	11	3	19
			% within category	26,3%	57,9%	15,8%	100,0 %

			% within question	14,3%	37,9%	60,0%	27,5 %
			% of Total	7,2%	15,9%	4,3%	27,5 %
	Total		Count	35	29	5	69
			% within category	50,7%	42,0%	7,2%	100,0 %
			% within question	100,0%	100,0%	100,0%	100,0 %
			% of Total	50,7%	42,0%	7,2%	100,0 %

Chi-Square Tests

Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	,662[c]	4	,956	1,000		
	Likelihood Ratio	,976	4	,913	1,000		
	Fisher's Exact Test	1,503			1,000		
	Linear-by-Linear Association	,004[d]	1	,947	1,000	,556	,162
	N of Valid Cases	39					
Mexico	Pearson Chi-Square	5,619[e]	4	,229	,253		
	Likelihood Ratio	7,083	4	,132	,219		
	Fisher's Exact Test	5,636			,182		
	Linear-by-Linear Association	3,428[f]	1	,064	,068	,041	,015
	N of Valid Cases	30					
Total	Pearson Chi-Square	8,862[a]	4	,065	,062		
	Likelihood Ratio	10,002	4	,040	,052		
	Fisher's Exact Test	8,461			,053		
	Linear-by-Linear Association	3,749[b]	1	,053	,060	,031	,009
	N of Valid Cases	69					

a. 3 cells (33,3%) have expected count less than 5. The minimum expected count is 1,23.

b. The standardized statistic is 1,936.

c. 6 cells (66,7%) have expected count less than 5. The minimum expected count is ,13.

d. The standardized statistic is -,067.

e. 7 cells (77,8%) have expected count less than 5. The minimum expected count is ,93.

f. The standardized statistic is 1,851.

Symmetric Measures							
Country			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,130			,956	1,000
		Cramer's V	,092			,956	1,000
	Interval by Interval	Pearson's R	-,011	,143	-,066	,948[c]	1,000
	Ordinal by Ordinal	Spearman Correlation	-,009	,147	-,056	,956[c]	,961
	N of Valid Cases		39				
Mexico	Nominal by Nominal	Phi	,433			,229	,253
		Cramer's V	,306			,229	,253
	Interval by Interval	Pearson's R	,344	,144	1,937	,063[c]	,068
	Ordinal by Ordinal	Spearman Correlation	,365	,134	2,073	,047[c]	,044
	N of Valid Cases		30				
Total	Nominal by Nominal	Phi	,358			,065	,062
		Cramer's V	,253			,065	,062
	Interval by Interval	Pearson's R	,235	,112	1,977	,052[c]	,060
	Ordinal by Ordinal	Spearman Correlation	,239	,114	2,018	,048[c]	,046
	N of Valid Cases		69				

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Table 6: Homogeneity Chi-Square "Protecting nature or having more jobs" and age

Age * Protecting the environment or having more jobs * Country*Crosstabulation							
Pais				**Protecting the environment or having more jobs**			Total
				Protect the environment	Balance	Depend on situation	
Colombia	Age	Young	Count	9	7	1	17
			% within category	52,9%	41,2%	5,9%	100,0%
			% within question	31,0%	70,0%	100,0%	42,5%
			% of Total	22,5%	17,5%	2,5%	42,5%
		Middle-Aged	Count	13	2	0	15
			% within category	86,7%	13,3%	0,0%	100,0%
			% within question	44,8%	20,0%	0,0%	37,5%
			% of Total	32,5%	5,0%	0,0%	37,5%
		Elder	Count	7	1	0	8
			% within category	87,5%	12,5%	0,0%	100,0%
			% within question	24,1%	10,0%	0,0%	20,0%
			% of Total	17,5%	2,5%	0,0%	20,0%
	Total		Count	29	10	1	40
			% within category	72,5%	25,0%	2,5%	100,0%
			% within question	100,0%	100,0%	100,0%	100,0%
			% of Total	72,5%	25,0%	2,5%	100,0%
Mexico	Age	Young	Count	0	8	2	10
			% within category	0,0%	80,0%	20,0%	100,0%
			% within question	0,0%	42,1%	50,0%	33,3%
			% of Total	0,0%	26,7%	6,7%	33,3%
		Middle-Aged	Count	5	8	2	15
			% within category	33,3%	53,3%	13,3%	100,0%

			% within question	71,4%	42,1%	50,0%	50,0%
			% of Total	16,7%	26,7%	6,7%	50,0%
		Elder	Count	2	3	0	5
			% within category	40,0%	60,0%	0,0%	100,0%
			% within question	28,6%	15,8%	0,0%	16,7%
			% of Total	6,7%	10,0%	0,0%	16,7%
	Total		Count	7	19	4	30
			% within category	23,3%	63,3%	13,3%	100,0%
			% within question	100,0%	100,0%	100,0%	100,0%
			% of Total	23,3%	63,3%	13,3%	100,0%
Total	Age	Jóvenes	Count	9	15	3	27
			% within category	33,3%	55,6%	11,1%	100,0%
			% within question	25,0%	51,7%	60,0%	38,6%
			% of Total	12,9%	21,4%	4,3%	38,6%
		Mediana edad	Count	18	10	2	30
			% within category	60,0%	33,3%	6,7%	100,0%
			% within question	50,0%	34,5%	40,0%	42,9%
			% of Total	25,7%	14,3%	2,9%	42,9%
		Mayor edad	Count	9	4	0	13
			% within category	69,2%	30,8%	0,0%	100,0%
			% within question	25,0%	13,8%	0,0%	18,6%
			% of Total	12,9%	5,7%	0,0%	18,6%
	Total		Count	36	29	5	70
			% within category	51,4%	41,4%	7,1%	100,0%
			% within question	100,0%	100,0%	100,0%	100,0%
			% of Total	51,4%	41,4%	7,1%	100,0%

Chi-Square Tests							
Country		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Colombia	Pearson Chi-Square	6,010[c]	4	,198	,165		
	Likelihood Ratio	6,410	4	,171	,179		
	Fisher's Exact Test	5,674			,154		
	Linear-by-Linear Association	4,580[d]	1	,032	,041	,021	,014
	N of Valid Cases	40					
Mexico	Pearson Chi-Square	5,256[e]	4	,262	,284		
	Likelihood Ratio	8,008	4	,091	,135		
	Fisher's Exact Test	5,448			,208		
	Linear-by-Linear Association	4,197[f]	1	,040	,043	,028	,014
	N of Valid Cases	30					
Total	Pearson Chi-Square	6,614[a]	4	,158	,153		
	Likelihood Ratio	7,544	4	,110	,145		
	Fisher's Exact Test	6,137			,166		
	Linear-by-Linear Association	5,878[b]	1	,015	,017	,009	,003
	N of Valid Cases	70					

a. 3 cells (33,3%) have expected count less than 5. The minimum expected count is ,93.

b. The standardized statistic is -2,424.

c. 6 cells (66,7%) have expected count less than 5. The minimum expected count is ,20.

d. The standardized statistic is -2,140.

e. 7 cells (77,8%) have expected count less than 5. The minimum expected count is ,67.

f. The standardized statistic is -2,049.

Symmetric Measures							
Country			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Colombia	Nominal by Nominal	Phi	,388			,198	,165
		Cramer's V	,274			,198	,165
	Interval by Interval	Pearson's R	-,343	,134	-2,249	,030[c]	,041
	Ordinal by Ordinal	Spearman Correlation	-,356	,140	-2,349	,024[c]	,025
	N of Valid Cases		40				
Mexico	Nominal by Nominal	Phi	,419			,262	,284
		Cramer's V	,296			,262	,284
	Interval by Interval	Pearson's R	-,380	,124	-2,177	,038[c]	,043
	Ordinal by Ordinal	Spearman Correlation	-,376	,122	-2,146	,041[c]	,037
	N of Valid Cases		30				
Total	Nominal by Nominal	Phi	,307			,158	,153
		Cramer's V	,217			,158	,153
	Interval by Interval	Pearson's R	-,292	,107	-2,516	,014[c]	,017
	Ordinal by Ordinal	Spearman Correlation	-,297	,108	-2,566	,012[c]	,013
	N of Valid Cases		70				

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Table 7 : Homogeneity Chi-Square analysis "Protecting nature or having more jobs" and country

Country * protecting nature or having more jobs Crosstabulation						
			protecting nature or having more jobs			Total
			Protect the environment	Balance	Depend on situation	
Country	Colombia	Count	29	10	1	40
		% within Country	72,5%	25,0%	2,5%	100,0%
		% within question	80,6%	34,5%	20,0%	57,1%
	Mexico	Count	7	19	4	30
		% within Country	23,3%	63,3%	13,3%	100,0%
		% within question	19,4%	65,5%	80,0%	42,9%
Total		Count	36	29	5	70
		% within Country	51,4%	41,4%	7,1%	100,0%
		% within question	100,0%	100,0%	100,0%	100,0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	16,955[a]	2	,000	,000		
Likelihood Ratio	17,773	2	,000	,000		
Fisher's Exact Test	17,027			,000		
Linear-by-Linear Association	16,609[b]	1	,000	,000	,000	,000
N of Valid Cases	70					
a. 2 cells (33,3%) have expected count less than 5. The minimum expected count is 2,14.						
b. The standardized statistic is 4,075.						

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	,492	,000	,000
	Cramer's V	,492	,000	,000
	Contingency Coefficient	,442	,000	,000
N of Valid Cases		70		
a. Not assuming the null hypothesis.				
b. Using the asymptotic standard error assuming the null hypothesis.				

Table 8: Homogeneity Chi-Square "People can stop climate change and they will succeed in dealing with it" and country

Country * people can stop climate change and they will succeed in dealing with it					
			People can stop climate change and they will succeed in dealing with it		Total
			No	Yes	
Country	Colombia	Count	23	16	39
		% within Country	59,0%	41,0%	100,0%
		% within question	43,4%	100,0%	56,5%
	Mexico	Count	30	0	30
		% within Country	100,0%	0,0%	100,0%
		% within question	56,6%	0,0%	43,5%
Total		Count	53	16	69
		% within Country	76,8%	23,2%	100,0%
		% within question	100,0%	100,0%	100,0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	16,023[a]	1	,000		
Continuity Correction[b]	13,803	1	,000		
Likelihood Ratio	21,931	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	15,791	1	,000		
N of Valid Cases	69				
a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 6,96.					
b. Computed only for a 2x2 table					

Table 9: Homogeneity Chi-Square analysis "People can make climate change to stop but it is not clear that people will do what needed to do so" and country

Country * people can make climate change to stop but it is not clear that people will do what needed to do so Crosstabulation					
			People can make climate change to stop but it is not clear that people will do what needed to do so		Total
			No	Yes	
Country	Colombia	Count	27	12	39
		% within Country	69,2%	30,8%	100,0%
		% within question	69,2%	40,0%	56,5%
	Mexico	Count	12	18	30
		% within Country	40,0%	60,0%	100,0%
		% within question	30,8%	60,0%	43,5%
Total		Count	39	30	69
		% within Country	56,5%	43,5%	100,0%
		% within question	100,0%	100,0%	100,0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,896[a]	1	,015		
Continuity Correction[b]	4,766	1	,029		
Likelihood Ratio	5,951	1	,015		
Fisher's Exact Test				,027	,014
Linear-by-Linear Association	5,810	1	,016		
N of Valid Cases	69				
a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 13,04.					
b. Computed only for a 2x2 table					

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	,292	,015
	Cramer's V	,292	,015
	Contingency Coefficient	,281	,015
N of Valid Cases		69	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Table 10: Homogeneity Chi-Square "Humans can't do anything to stop climate change and country

Country * Humans can't do anything to stop climate change* Crosstabulation					
			Humans can't do anything to stop climate change		Total
			No	Yes	
Country	Colombia	Count	35	4	39
		% within country	89,7%	10,3%	100,0%
		% within question	53,8%	100,0%	56,5%
		% of Total	50,7%	5,8%	56,5%
	Mexico	Count	30	0	30
		% within country	100,0%	0,0%	100,0%
		% within question	46,2%	0,0%	43,5%
		% of Total	43,5%	0,0%	43,5%
Total		Count	65	4	69
		% within country	94,2%	5,8%	100,0%
		% within question	100,0%	100,0%	100,0%
		% of Total	94,2%	5,8%	100,0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3,266[a]	1	,071	,127	,095	
Continuity Correction[b]	1,658	1	,198			
Likelihood Ratio	4,753	1	,029	,127	,095	
Fisher's Exact Test				,127	,095	
Linear-by-Linear Association	3,219[c]	1	,073	,127	,095	,095
N of Valid Cases	69					
a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 1,74.						
b. Computed only for a 2x2 table						
c. The standardized statistic is -1,794.						

Symmetric Measures						
		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	-,218			,071	,127
	Cramer's V	,218			,071	,127
Interval by Interval	Pearson's R	-,218	,057	-1,825	,073[c]	,127
Ordinal by Ordinal	Spearman Correlation	-,218	,057	-1,825	,073[c]	,127
N of Valid Cases		69				
a. Not assuming the null hypothesis.						
b. Using the asymptotic standard error assuming the null hypothesis.						
c. Based on normal approximation.						

Table11: Chi-Square analysis for "Humans can't do anything to stop climate change" and ideology joint databases

Ideologia * Humans can't do anything to stop climate change Crosstabulation					
			Humans can't do anything to stop climate change		Total
			No	Yes	
Ideology	Left	Count	11	0	11
		Expected Count	10,7	,3	11,0
		% within category	100,0%	0,0%	100,0%
		% within question	31,4%	0,0%	30,6%
		% of Total	30,6%	0,0%	30,6%
	Centre-left	Count	15	0	15
		Expected Count	14,6	,4	15,0
		% within category	100,0%	0,0%	100,0%
		% within question	42,9%	0,0%	41,7%
		% of Total	41,7%	0,0%	41,7%
	Centre right	Count	4	1	5
		Expected Count	4,9	,1	5,0
		% within category	80,0%	20,0%	100,0%
		% within question	11,4%	100,0%	13,9%
		% of Total	11,1%	2,8%	13,9%
	Right	Count	5	0	5
		Expected Count	4,9	,1	5,0
		% within category	100,0%	0,0%	100,0%
		% within question	14,3%	0,0%	13,9%

		% of Total	13,9%	0,0%	13,9%
Total		Count	35	1	36
		Expected Count	35,0	1,0	36,0
		% within category	97,2%	2,8%	100,0%
		% within question	100,0%	100,0%	100,0%
		% of Total	97,2%	2,8%	100,0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6,377[a]	3	,095	,278		
Likelihood Ratio	4,135	3	,247	,278		
Fisher's Exact Test	4,528			,278		
Linear-by-Linear Association	,800[b]	1	,371	,583	,278	,139
N of Valid Cases	36					
a. 6 cells (75,0%) have expected count less than 5. The minimum expected count is ,14.						
b. The standardized statistic is ,894.						

Symmetric Measures						
		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	,421			,095	,278
	Cramer's V	,421			,095	,278
	Contingency Coefficient	,388			,095	,278
Interval by Interval	Pearson's R	,151	,082	,892	,379[c]	,583
Ordinal by Ordinal	Spearman Correlation	,181	,094	1,071	,292[c]	,583
N of Valid Cases		36				
a. Not assuming the null hypothesis.						
b. Using the asymptotic standard error assuming the null hypothesis.						
c. Based on normal approximation.						