

Adaptation Narratives: Climate Change and Environmental
Politics in Mexican Coastal Communities

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ABSTRACT

This dissertation explores some key challenges the Mexican government and international organizations such as the World Bank may face when implementing climate change adaptation initiatives in coastal lagoon communities in the Mexican state of Tabasco, in the Gulf of Mexico. My analysis of the government's climate change adaptation initiatives, scientists' explanations, and fishers' views on local environmental changes is based on political ecology approaches to environmental narratives, and critical literature on climate change. It outlines the interaction among three environmental narratives: that produced by the Mexican government and its allies who are re-orienting environmental programs into climate change adaptation programs; scientific narratives on coastal environmental processes including coastal erosion; and the narrative produced by poor fishers who are dependent on lagoon and coastal resources for their livelihoods, and who blame the off shore oil industry for most of their environmental problems. Scientific accounts of coastal environmental change tend to support more the position of fishers than the government, which produces a need for the government to be selective in how it uses science to justify its adaptation programs. The dissertation then examines the challenges that state initiatives of this type face when they interact with local environmental politics involving fishers and the state-owned oil industry. While fishers blame the oil industry for environmental problems, government adaptation programs seek to enrol fishers and the oil industry together as vulnerable to the local effects of climate change such as coastal erosion and increased frequency of hurricanes. I

discuss how through processes of simplification, state agencies render complex political issues into technical problems, but how, in light of local conflicts, climate change adaptation interventions become highly political on the ground. I also argue that climate change policy analysis must be done in light of past and failed state interventions in Tabasco, which have resulted in what scholars have called a “harmful development” for fishers and ecosystems (Tudela, 1989).

Este trabajo se lo dedico a mis amores Sofía y Emiliano,
por todo su amor y comprensión... y por mis ausencias presentes

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CHAPTER 1. RESEARCH PROBLEM AND OBJECTIVES

1.1 Introduction

The objective of this dissertation is to analyze climate change adaptation narratives in Mexico; it discusses the framings and perceptions different actors attach to this issue. My research aims to understand how this problem is understood and explained and how these interpretations are translated into a range of initiatives and projects. Rather than explain what climate change and adaptation actually “are,” this research analyzes how government officials, scientists and fishers understand climate change and adaptation, and the kind of actions those framings are leading to.

Internationally, there is consensus that there is climate change, that these changes are already substantial, but that the precise nature of future climate change is not easily predicted. The Intergovernmental Panel on Climate Change (IPCC) explains climate change as a problem caused by human activities through the emission of greenhouse gasses that are changing the climate and inducing negative impacts on society (Beck, 2011, p. 300). The IPCC approach to climate change has three characteristics: (i) it is an impact-based approach in which (ii) the main problem is long-term climate change and (iii) its spatial scale is global. This organization defines climate change as follows:

Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces such as modulations of the solar

cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2013, p. 1450).

To some degree, there is consensus that two courses of action are required: mitigation and adaptation. Mitigation has been clearly defined as anthropogenic intervention through the implementation of policies to reduce emissions and enhance sinks (IPCC, 2001, p. 716). However, the literature on adaptation reflects the multiple and contested nature of institutional and funding frameworks. The definition of the IPCC – adopted in government narratives – is that adaptation is

the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014, p. 1).

Some scholars emphasize the ecological dimension of adaptation, defining it as “any response that increases a population's probability of survival” (Berkes & Jolly, 2001, p. 2).

This research focuses on three particular networks: national and provincial governments, the community of scientists working on climate change and fishers from five coastal communities in the Gulf of Mexico. I use a narrative analysis approach to discuss climate change policies and projects, as well as scientists’ and fishermen’s explanations and understandings of environmental changes. Analysis of narratives (Roe, 1995; Forsyth, 2003; Fairhead & Leach, 2000 and 1995; Batterbury, Forsyth & Thomson, 1997) highlights how particular actors

understand and frame problems. It allows us to scrutinize what and who are included or excluded (Gasper & Apthorpe, 1996, p. 8) or what aspects are being distinguished or avoided in the story lines of such frameworks. This is a methodological approach that helps us analyze how problems get defined and the sort of political consequences these definitions convey (Hajer, 1995, p. 2). This approach critically examines the way evidence is gathered and the types of solutions actors propose to problems (Scoones, 1997).

My research makes a close inquiry into how written and non-written narratives define problems, attribute responsibilities, explain solutions, and elaborate on ideas about the role of subjects of government. In my view, the analysis of narratives is important because different discourses, definitions, and questions lead to various policy prescriptions that impact people's lives, since they lead to specific ways of:

setting agendas; defining goals; characterising options; posing questions; prioritizing issues; deciding context; setting baselines; drawing boundaries; discounting time; choosing methods; including disciplines expertise or informal knowledge, and handling uncertainties (Leach, Scoones & Stirling, 2010, p. 371).

In this research I do not analyze narratives in themselves, in isolation, as "self-contained dialogue" (Zimmermer, 2004, p.111). Rather, I look at the structuring factors shaping narratives: the historical political economy of local communities and the social space (Bourdieu, 1989) in which narratives emerge. I elaborate on Bourdieu's ideas regarding agents' points of view, which are determined by their positions within social space (Bourdieu, 1989). As this

sociologist explains, social constructions are “not carried out in a social vacuum but subjected to structural constraints” that need to be identified and grasped (Bourdieu, 1989, p. 18).

Even though this dissertation looks at three sets of actors, I disproportionately focus on government narratives, since they have a dominant role in defining and framing the topic. Therefore, the networks I rely on to analyze my research questions are unequal, since government projects, policies and initiatives – drawing on international cooperation frameworks, financing institutions and governments – are the dominant actors promoting adaptation initiatives and mobilizing funding resources. Governments’ definitions and diagnoses of the research problem are based on scientific narratives; however, as I discuss in this dissertation, government officials are key actors in using, re-framing and presenting the climate change problem on their own.

Scientists have played an important role in promoting climate change within the government agenda. However, it is necessary to analyze their narratives separately from government narratives since they show scientists’ need to legitimate their participation in such government initiatives while at the same time actively engaging in boundary work so they separate their positions and perspectives from the governments’. Analysis of their narratives sheds light on processes of coproduction and the complex interactions of science and policy.

In this dissertation I present scientists’ explanations and positions as if they have a singular, unified position about the topics I discussed with them in the interviews. When I discuss “scientists’ explanations” I recognize the existence

of different positions and views among them. However, it is important to state that in my interviews, they mostly coincided in their opinions about the topics we discussed. I did not identify any counternarrative or alternative position to analyze in my research.

Fishers' understandings of local environmental changes coincide with scientific analyses of coastal ecosystem dynamics. However, this is not to say that their views are shaped by scientific discourses; rather, their explanations reflect more their local environmental knowledge, which is informed by their experience living in these ecosystems and, by their ancestral knowledge of fishing and other coastal activities. Their views on environmental changes are also strongly determined by their conflict-driven relations with the state-owned oil company that has impacted fishers' natural ecosystems, their social relations, politics and economy.

In chapter 3, I discuss the existence of different types of fishers, with differentiated material and political resources and interests. In that chapter I also explain that I do not conceive "local communities" as a homogeneous entity. However, despite of this plurality of actors, in this dissertation I refer to "fishers' views" when they explain their positions about the topics I discussed with them in interviews. I used this term because in relation to my topic, I identified more commonalities and coincidence than dissent among them. As I was told by some of the fishers I interviewed, fishers maintain unified positions and interests when it comes to protecting their interests. Therefore, it is not completely odd that

fishers expressed unified views regarding the problems they have and what they identified as the agents and processes causing them.

Finally, it is important to clarify that in my research I do not look at global climate change discourses in themselves, at how they originate in the IPCC or in other international mechanisms such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Neither do I explore the interconnections between them and national government climate change discourses. These are topics and research questions that are beyond the reach of my dissertation. Although I use direct sources, I do not explore in depth these organizations' assumptions and the analysis scholars have done of the different controversies around these global frameworks on themes such as transnational governance, posing questions such as "who governs and on whose behalf, how they govern and the implications of those practices of governing, in social and environmental terms" (Newell, 2008, p. 528); the problems and conceptual definitions that arise from the policy implications of "misdefining" climate change (Pielke, 2005; Hulme, 2008); institutional analysis of the IPCC and its trajectory (Agrawala, 1998; Hulme & Mahony, 2010), among others. Instead, I mostly discuss these global frameworks through my analysis of how Mexican governments present them in official documents.

This dissertation contributes to the field of environmental sociology. Specifically, it contributes to literature that analyzes how environmental problems are constructed and to discussions that criticize the apolitical nature of global narratives that highlight the existence of "common" interests and views on global

problems, overlooking power relations among unequal actors. It also contributes to political economy perspectives within environmental sociology that emphasize global inequalities, as well as the effects of capitalism and state interventions on disadvantage populations.

My research also contributes to the field of development studies by characterizing the emergence of a new re-oriented climate change narrative that conveys new goals, ideals, social representation and ways of framing existing development problems under a climate change approach. Finally, another contribution is specific to the Mexican scholarship, by introducing a critical perspective on the topic of adaptation that is until now nonexistent in Mexico.

This chapter is organized as follows: In the next section I discuss the research problem and main arguments developed in the dissertation. In the third section I discuss the theoretical perspectives used in the research, and at the end I describe the organization of the dissertation.

1.2 The Research Problem and Main Arguments

In a regional meeting on climate change a Latin American government official presented a paper entitled “If We Adapt to Climate Change We Will Develop,” a very suggestive title that raises questions about the way governments are framing and understanding both climate change adaptation and development. For the representative of the United Nations for Development in Mexico, adaptation means “not only a better development, but a different development” (UNDP, 2012). The coupling of adaptation-development has been a core topic of

analysis and discussion in international organizations, governments, academic institutions and non-governmental organizations that are discussing how to better design and implement adaptation projects that also attend to poverty reduction and vulnerability to climate change. It is within these climate change narratives that development concepts, processes and practices are reframed. Development is conceived as the process of transition or transformation toward a society more “adaptive” to climate change – replicating past teleological development goals. It is through the articulation of these discourses that new goals emerge, such as enhancing the “adaptive capacity” of both human and natural ecosystems. Climate change is explained as a dual phenomenon that on one hand imposes impacts and challenges to ecosystems, populations and economies, and on the other hand represents an “opportunity” to explore and exploit. However, in this framework, poor countries carry a double burden. Not only are they poor, but living in such conditions makes their population unable to cope and adapt to climate change impacts. Climate change discourse perpetuates the classic First-Third World divide but now based on a set of abilities countries should acquire to be on one side or the other of the adaptive/non-adaptive divide. Leatherman and Nicholls (1995), for example, state that worldwide Bangladesh “is often cited as a major loser to accelerated sea-level rise, and it is considered one of the most vulnerable countries to climate change” (p. 11). The existence of losers implicitly conveys the idea of the existence of winners in a climate change setting where only some countries are or would be able to exploit the “opportunities” climate change will bring to some people and territories. Only some countries, with a

certain set of capacities, will better adapt to a range of climate change impacts. The divide implicitly refers to the existence of certain intrinsic capacities that are strongly determined by countries' geographic locations – locations that determine their climatic conditions and their orography and hydrology. These are factors that contribute to a greater or lesser extent to countries' exposure to hydro meteorological events that are expected to increase under climate change conditions. The divide also refers to a set of extrinsic qualities such as a lack of policies, planning and technology. As in past development crusades, the need to cope with the impacts of climate change is the driving force for the call for “global responses” that are translated into a wide range of actions from research to funding and other cooperative efforts.

This dissertation is a product of the analysis of critical perspectives on climatic and environmental changes that highlight the need to understand and critically analyze the concepts and practices these narratives are promoting, their meanings, and their consequences. I take up political ecologists' arguments that narratives of environmental change “are not neutral from society, but reflect the needs and agendas of societies and regimes that constructed them” (Batterbury et al., 1997, p. 130). My approach is also based on sociological analyses of power that explain how narratives (words, names) are expressed through social constructs and perceptions. Narratives “construct social reality as much as they express it, [and] are the stake par excellence of political struggle, which is a struggle to impose the legitimate principle of vision and division” (Bourdieu, 1989, p. 21).

In what follows I explain the research questions, the key arguments and the theoretical approaches that will help frame and understand the research problem.

Research Questions and Arguments

The overarching research question is: What are the implications of using global frameworks to explain local environmental changes? To address this broad question on climate change adaptation narratives, I focus the analysis on four sub-questions:

1. How do these global frameworks manifest in coastal communities in the Gulf of Mexico?
2. What consequences do those framings entail, and for whom?
3. How are these discourses shaping new development narratives?
4. How do scientists and fishers' narratives explain environmental changes in coastal communities? How do they contest and challenge the assumptions in government climate change narratives?

In what follows I discuss these questions by explaining the core arguments I develop in the dissertation.

a) De-politicizing Contentious Political Issues

In response to these questions, I argue that climate change narratives in Mexico are reframing historical development problems under an approach that emphasizes the need to adapt to climate change impacts. Climate change is

being positioned as an important issue that is causing or has the potential to impact a wide range of problems. Emphasis is on how people can face impacts, diverting the discussion of how to address the conditions that are in the first place determining the magnitude of climate or non-climate related impacts on peoples, communities and ecosystems. I argue that in Mexico, climate change adaptation narratives could be understood as framings that de-politicize contentious political, economic and environmental problems on the ground. They overlook the broader political economy of environmental changes.

In an interview, a scientist explained that climate change “apparently is a politically ‘neutral’ topic.”¹ She explained that governments can argue for the need to design government interventions in the name of climate change – e.g. the reduction of greenhouse gas emissions – without facing any resistance from the population. She added that unlike other environmental problems, such as the ones that involve Canadian mining companies or international corporations like Nestlé – where local communities have resisted economic projects that intend to exploit their local resources – climate change as a topic used by governments is more easily able to navigate social resistance. The government position against greenhouse gas emissions might not easily be questioned or labeled as a highly contentious “political” issue.

This dissertation, however, demonstrates the highly political nature of climate change interventions. This observation emerged as a result of a close analysis of local political, economic and environmental processes in coastal

¹ Interview with a scientist from the Atmospheric Sciences Center, National University of Mexico, Mexico City, June 5, 2012.

communities, which illustrate the existence of local contentions among powerful actors over territory and its resources. Climate change adaptation narratives, I argue, become highly political to the extent that they define the nature of local environmental changes – coastal erosion – and propose solutions that involve resource control, access or management.

Government climate change narratives emphasize sea-level rise – that results from global processes such as melting glaciers and thermal expansion – as the main factor driving erosion. However, Mexican geologists have recorded the existence of coastal erosion along the case coasts since the 1940s. Based on historical data analysis these scientists have concluded that land subsidence – due to sediment compression and oil and gas extraction – is the main driver of coastal erosion. As I explain further in this dissertation, this resonates with what scientists around the world have pointed out: that sea-level rise is not necessarily the primary driver of coastal erosion, also highlighting the need to consider the diversity of regional factors. Fishers, who hold different explanations of the causes of coastal erosion, produce a third account. From their perspective, coastal erosion is a “man-made” problem. They argue that the origin of this problem goes back to 1975, when the oil industry built coastal infrastructure that changed sea currents, which caused erosion along their coasts. Fishers’ accounts coincide with scientists’ in attributing the emergence of erosion to the building of infrastructure: deep-water ports, channels, and artificial openings. I argue that adopting climate change frameworks to explain long-term environmental changes such as coastal erosion allows governments to sidestep

contentious local political problems that are at the core of some socio-natural phenomena like coastal erosion – such as the role of the oil industry in causing erosion and environmental degradation, land-use changes, and deforestation.

Fieldwork findings suggest that in Mexico climate change as a public issue has also been adopted by governments as a causal explanation of disasters and environmental problems recently experienced in Mexico, such as floods, water scarcity, or other problems. An example is the flooding the province of Tabasco experienced in 2007, regarded by the government as one of the most costly disasters in Mexico's history (CICC, 2012a). In this event, 62% of the province was under water and 75% of the total population, from 679 communities, was affected (Perevochtchikova & Lezama, 2010, p. 73). Scientists working in that province criticized the government and media's emphasis on climate change impacts – the increasing frequency and intensity of storms – that overlooks the anthropogenic sources of such disasters. In their study of this phenomenon, Perevochtchikova and Lezama (2010) explain that governance problems related to land-use change, dam management, hydraulic infrastructure, urban planning, deforestation, and corruption are among the many factors that explained this phenomenon. This disaster was also the cause of public outrage against government authorities since it was argued that they had diverted public funds originally budgeted for water management planning and infrastructure – a project that was never implemented. In an interview, a scholar referred to this disaster as an example of “genocide” since water administrators “deliberately” ordered the diversion of waters from dams and rivers towards the region where most

indigenous communities are settled so they could prevent damages to industries, urban infrastructure and the population in the capital city.² This is another example of how a complex, abstract and unclear meaning of “climate change” can be used and appropriated to assign responsibilities and overlook structural problems – lack of planning, corruption, lack of early alert systems, land-use change, and many other factors causing such problems or increasing people’s vulnerabilities to their impacts.

I argue that government narratives have “unintended” effects (Ferguson, 1994). In this case study, the most important is the depoliticization of government interventions, local problems and social relations. My research illustrates that government initiatives recognize the catastrophic social and environmental impacts past state interventions had in Tabasco. However, despite such recognition, these initiatives propose projects and measures to face climate change that are divested of any consideration to address the complex local conditions that are causing environmental changes in the first place. I demonstrate how these interventions aim to render as “technical” contentious political problems (Ferguson, 1994; Li, 2007).

b) Shaping a New Development Narrative? The Promises of Adaptation for Local Communities

As I explain above, a research question this dissertation explores is how climate change narratives are redefining the very content and grammar of development

² Interview with a social sciences scientist, Multidisciplinary Regional Research Center, National University of Mexico, Tabasco, Mexico, May 30 2012.

frameworks in Third World contexts such as Mexico. In order to address this question, this research identifies assumptions that frame climate change adaptation as a neutral and beneficial practice governments need to promote to help populations and natural ecosystems better face climatic impacts. It analyzes characteristics of government narratives that (i) present new ways of framing local people's vulnerabilities, (ii) define new goals to be pursued by both governments and people, (iii) identify new obstacles to overcome, and that (iv) frame new understandings of the role of the subjects of government, and with this, new social representations of fishers.

Hajer (1995) defines story-lines as "devices through which actors are positioned, and through which specific ideas of 'blame' and 'responsibility', and of 'urgency' and 'responsible behaviour' are attributed" (p. 64-65). In this research, government initiatives are analyzed as story-lines that emphasize the global dimension of the climate change problem and the urgency in attending its "inevitable" impacts. It also identifies the differentiated attribution of responsibilities in solving environmental problems as well as the type of "responsible behavior" expected from fishers. This research discusses the problems that the use of generic categories such as "citizens," "coastal populations" or sectors – which are urged to change productive practices or adopt adaptive strategies to cope with impacts – may have for local actors.

In this regard I argue that climate change narratives, in elaborating and envisioning strategies and policies for how populations can get a better future, are: (i) taking up past development assumptions and practices in the process of

defining the problem and solutions; (ii) integrating new problems to be faced and fixed and; (iii) elaborating on emergent categories, social representations and roles.

c) The Transition from Global-to-Local

In my research I question assumptions about the movement of narratives and scientific knowledge from the global-to-local (e.g. world polity theories), which describe the process as static, one-way and unquestioned (Pellow & Brehm, 2013). This dissertation demonstrates the various levels in which such global frameworks are reshaped, adopted and challenged on the ground. I argue that national and provincial government agencies are key actors shaping these narratives. In the process they reinterpret climate change as a public issue explained in public reports – a process through which the voices of scientists and scientific knowledge are either reframed or overlooked. I argue that looking at the sphere of government allows us to understand the various ways knowledge is produced, promoted and used, challenging classic understandings of science and the role of scientists in posing problems and their solutions.

Fieldwork findings show how “localization” (Hulme, 2008) of global frameworks take place, how these frameworks are continuously negotiated on the ground, by a range of actors with particular agendas and interests. I analyze scientists’ perspectives on climate change, specifically I discuss some contentious problems regarding policy implementation as well as framing issues. I also discuss how scientists accommodate their interests and perspectives to an

emergent climate change agenda promoted by government officials and epistemic communities. I also analyze fishers' perceptions of environmental changes, I elaborate on fishers' criticisms on the main factors causing such changes that implicitly challenge climate change narratives.

1.3 Theoretical Perspectives

This dissertation draws on narrative analysis as an overall approach to address my research questions. I use this method of inquiry as it has been used in political ecology, sociology, science and development studies. I also base my analysis on science and technology studies, from which I use two key concepts – boundary work and coproduction – to explain the science-policy intersection in the making of climate change policies.

1.3.1 Narrative Analysis

To explore my research questions I use narrative analysis as a methodological approach that facilitates the identification of the existence of competing interpretations of local changes, and with it, the recognition of potential material and non-material consequences of privileging certain frameworks and sidestepping others. Narratives, then, are means I use to elaborate on the analysis of (i) the making of policy problems and (ii) people's accounts, understandings and meanings of their social world.³

³ Narrative analysis is based on numerous approaches that cut across several theoretical and disciplinary boundaries (Orbuch, 1997, p. 466). It emerged since the 1980s, but most predominately since the “cultural turn” during the 1990s (Harling, 2010; Orbuch, 1997). Ewick and Silbey (1995) explain that there has been a proliferation of definitions of “narratives” in

In my research I do not intend to do a sociology of narrative, looking at narrativity as the object of inquiry in itself. I use it as a method of research, as a means and “mode of observation, a vantage from which the world can be seen or heard” (Ewick & Silbey, 1995, p. 203). I apply a sociological analysis when I write “accounts of accounts” produced by social subjects (Bourdieu, 1989, p. 15). As Laslett (1999) explains, figuring out what a narrative is constructed for is one task of sociological analysis (p. 392). It has also been argued that sociologists should be interested in narrative analysis since “narrative texts are packed with sociological information, and a great deal of our empirical evidence is in narrative form” (Franzosi, 1998, p. 517).

A key sociological concept I use in my analysis of narratives is that of framings, a notion that is defined as “organizing devices that allow the selection and emphasis of topics to decide ‘what matters’ (Grundman & Stehr, 2010, p. 904). My analysis of framings questions the various processes they carry out: problem definition, causal interpretation, moral evaluation and treatment recommendation for the problem (Grundman & Stehr, 2010).

sociological analysis. They identify, from these definitions, some key characteristics to be qualified as narrative. First, a narrative relies on some form of selective appropriation of past events and characters. Second, within a narrative the events must be temporally ordered, with a beginning, a middle, and an end. Third, the events and characters must be related to one another and to some overarching structure, often in the context of an opposition or struggle (Ewick and Silbey, 1995, p. 200). Roe (1991) characterizes development narratives using some of these characteristics as well. Meaningfulness and sociality are also identified as main characteristic dimensions of this concept; meaningfulness “indicates that narratives are not necessarily instances of ‘truth’ but rather what is important to the narrators” (Harling, 2010, p. 597). Orbuch (1997) explains that “narratives are ‘real’ events as presented, and narrative analysis pays special attention to the form, coherence, and structure of these stories” (p. 466). Sociality refers to the social and historical context in which narratives emerge as well as to the specific audience they aim to address (Harling, 2010, p. 597).

My dissertation is based on political ecology and environmental sociology,⁴ and their approaches to narratives that discuss the problems of adopting predominant frameworks of environmental change. Political ecology is a paradigm focused on explaining how power relations are reflected in conflicting perceptions, discourses and knowledge claims about nature. In this field, narratives have been defined as “simplified explanations of environmental cause and effect that emerge in contexts where environmental knowledge and social order are mutually dependent” (Forsyth & Walker, 2008, p. 17). Particular frameworks of environmental change, scholars argue, are used to justify interventions that are imposing prohibitions, regulations and practices on local communities (Fairhead & Leach 2000). Narratives, therefore, have material impacts on people’s lives, on government budgets, and on the allocation of international funding for local projects as well.

Forsyth and Walker (2008) explain that in environmental studies,

The term ‘narrative’ has been used to describe succinct summaries of environmental cause and effect that are seen as factual within popular debates or policy networks, but which are essentially based on highly selective participation in problem definition and knowledge production.

⁴ Environmental Sociology has been defined as “the study of interrelationships between society and the environment” (Humphrey, Lewis, & Buttel, 2003, p. 23). This field emerged between the late 1960s early 1970s, in the aftermath of the mobilization of the US environmental movements, and thus in response to the emergence of widespread societal attention to environmental problems. The origin of environmental sociology was based on a critique of classical sociological thought and its anthropocentrism; a core idea in environmental sociology is the need to incorporate nature into the sociological analysis. We can say that the precursors focused on answering a core question, which Carolan (2005) indicates can be framed as follows: “what place, if any, should there be for the biophysical in sociology?” (p. 11). Buttel explains that “the basic essence of environmental sociology ‘has been to recover and uncover the ‘materiality’ of social structure and social life, and to do so in ways that yield insights relevant to solving environmental problems. Materiality, in this context, involves the dependence of human societies on natural resources and the biophysical condition necessary for human and nonhuman life” (quoted in Humphrey et al, 2003, p. 1).

As a result, environmental narratives frequently impose meanings that are acceptable to their creators or users, but which may contain unwelcome implications for other social actors (p. 17).

This dissertation elaborates on these ideas, discussing the existence of a plurality of histories, voices and understandings of environmental change, which I argue, are challenging the definition of problems displayed within government narratives.

The interrelation between language/narratives/discourses, and power/space/social order discussed by political ecologists has also been a core theme in sociological analysis. Critical discourse analysis, for example, highlights the centrality of language in power relations; it “investigates the category of discourse as a form of power and as an instrument of the social construction of ‘reality’” (Marston, 2004, p. 37). These approaches focus on the “social and political context and relations of power that shape and are shaped by discourse” (Marston, 2004, p. 37). Narrative analysis is salient in the postempiricist analysis⁵ of public policies, an approach that “focuses on the crucial role of language, discourse, rhetorical argument, and stories in framing both policy questions and the contextual contours of argumentation, particularly the ways normative presuppositions operate below the surface to structure basic policy definitions and understandings” (Fischer, 2003, p. 14).

⁵ Postempiricism is defined as an “epistemological orientation that seeks to move beyond an ‘objectivist’ conception of reality” (Fischer, 2003, p. 12). This is a perspective that challenges neopositivist/empiricist methods which emphasize “rigorous quantitative analysis, the objective separation of facts and values, and the search for generalizable findings whose validity would be independent of the particular social context from which they were drawn” (Fischer, 2003, p. 4).

Orbuch (1997) explains that accounts, narratives or stories are all associated concepts that constitute “a major avenue for sociologists to depict and understand the ways in which individuals experience and identify with that meaning and their social world” (p. 455). In my dissertation, I use political economy as a perspective that informs the social, political and economic context from which individuals’ experiences emerge. I understand individuals’ experiences as the product of people’s interactions and dynamics within political and economic institutional settings that have historically shaped people’s perceptions and understandings of their social realities. In my research, then, I conceive of actors’ narratives, and the lives these narratives describe, as ideas that have been “shaped by relations of production and power, systems of language, symbols, beliefs, and cultures, as well as histories and geographies” (Laslett, 1999, p. 392). I adopt a concept of narratives that describes them as “socially organized phenomena which, accordingly, reflect the cultural and structural features of their production” (Ewick & Silbey, 1995, p. 200).⁶

Subversive Narratives

Ewick and Silbey (1995) highlight two important dimensions of the narrative analysis approach. The first is its epistemic dimension, since this is a methodological approach with “the capacity to reveal truths about the social world that are flattened or silenced” by traditional social science methods (p.

⁶ These characteristics and definitions of narratives differ from other associated concepts such as accounts that as Orbuch (1997) explains, were used in early sociological studies – and influenced by ethnomethodology and social psychology scholars – “to understand deviance or disruptions in social interaction and the consequences of accounts for the nature and maintenance of that interaction” (p. 458).

199). This characteristic has also been highlighted by other scholars, who argue that narrative analysis goes beyond the instrumental rationality predominant in policy research, based on empirically based rational decision methods (Fischer, 2003, p. 10) that privilege data and measurement at the expense of meaning and context (Marston, 2004). Sociologists using microsociological approaches point out the relevance of narrative analysis in emphasizing temporality, contextuality and subjectivity – characteristics that from other perspectives may represent the very flaws of this approach to explain social problems (Laslett, 1999, p. 400).

The second important characteristic is its political dimension, since narrative analysis identifies and interprets actors' material and symbolic struggles. It is an approach that allows us to understand the many factors accounting for narratives becoming hegemonic – reproducing existing relations of power and inequity – and subversive stories that challenge such hegemony “by making visible and explicit the connections between particular lives and social organization” (Ewick and Silbey, 1995, p. 197). Moreover, through narrative analysis one is able to map and identify perspectives that are otherwise obscure or overlooked within predominant frameworks and story-lines.

In my case study, narrative analysis has allowed me to recognize the existence of a variety of perspectives and accounts, of “counternarratives” (Batterbury et al., 1997; Fairhead & Leach, 1995; Fairhead & Leach, 2000; Roe, 1995) which implicitly question how problems are defined and by whom, but more importantly, which problems count in the first place. Furthermore, scholars argue that the identification and construction of counternarratives to predominant

views can better inform policies that are going to impact peoples' lives (Forsyth, 2003). Narrative analysis, then, potentially represents a tool researchers may use to make counterinterviews socially visible, to enhance their "subversive and transformative potential" (Ewick & Silbey, 1995).

It is important, however, to state that narrative analysis may also show us the existence of continuities or a reinforcement of predominant or hegemonic ideas that are reproduced by agents. People's narratives, then, are not always counterhegemonic, but may unintentionally serve as vehicle to reproduce existing meanings, understandings and perceptions. Another form we may find, as my case shows, is the existence of narratives that do not necessarily always engage with dominant narratives. Sometimes fishers' narratives engage with global climate change frameworks, specifically in identifying what is climate change and how it manifests at a global scale. In other accounts, however, like in the case of explaining local environmental changes, fisher's views rely on their own history and politics to elaborate counter-accounts. Narrative analysis then, may provide rich reflections not only of the many challenges actors encounter but, most importantly, of actors' agency and the resources they may potentially mobilize to articulate alternative discourses, narratives, and ideas to transform their social reality.

Critical Perspectives on Climate Change Narratives

More generally, my analysis of narratives is informed by the literature on critical perspectives on climate change, which highlights the various equity and human

rights implications of using global frameworks that are redefining problems and identities, and how in this process local inhabitants' perspectives and voices are being misrepresented (Cameron, 2012; Bravo, 2009; Felli & Castree, 2012; Farbotko & Lazrus, 2012; Hartmann, 2010). As I discuss further in this dissertation, my analysis resonates with the discussion that climate change scholars explore when they analyze how climate change narratives are imprinting particular meanings onto highly problematic concepts. These critical approaches – predominantly addressed by sociologists, geographers and anthropologists – highlight the potential social, political and economic implications dominant frameworks of environmental change might convey to local actors.

Cameron (2012) for example, discusses how global narratives are defining Indigenous peoples and communities in terms of their attributes as “local” and “traditional”, attributing new social representations to local inhabitants as “victims” or “climate refugees.” Scholars argue that such categories distort historical social processes that communities have experienced for generations, such as migration (Farbotko & Lazrus 2012) or the overexploitation of natural resources by extractive economies such as in the case of Tabasco. Hartmann (2010) criticizes the use of the concept of “environmental refugee,” for example, because “it naturalises the economic and political causes of environmental degradation and masks the role of institutional responses to it” (p. 235). Bravo (2009) explains that global change narratives are “constructing a new Arctic regional identity,” in which citizens “are portrayed as being an at-risk community,

a victimised community lacking the agency to fight back, and the keepers of valuable traditional knowledge” (p. 258).

There have been additional criticisms of how the climate change global discourses have framed vulnerability⁷ particularly in developing regions, that portray people and regions as passive and helpless actors, as weak, powerless, unstable and marginal, in the need of external help – ideas that are re-creating pre-existing colonial representations in those regions (Barnett & Campbell 2010). Barnett & Campbell (2010) argue that

It is not our argument that the Pacific Islands do not face serious risks arising from climate change, but we do argue that the mantra of vulnerability is problematic, can be counterproductive, and so needs to be used with caution and with a sensibility to its negative connotations (p. 99).

However, as these authors recognize, “outsiders” are not the only ones representing these sites and their people as vulnerable. National leaders are also strategically appropriating and mobilizing this discourse and its many representations in international forums – so these nations can have a voice that call for the need to reduce emissions and to negotiate adaptation funding as well (Barnett & Campbell, 2010, p. 166). Other scholars argue that it is important to distinguish the existence of different framings of vulnerability, not necessarily because they define it differently, but because they are “fundamentally” defining the climate change problem. They “are manifestations of different discourses on climate change – discourses that not only represent different approaches to

⁷ Fussel (2007) explains that “[t]he ordinary use of the word ‘vulnerability’ refers to the capacity to be wounded, i.e., the degree to which a system is likely to experience harm due to exposure to a hazard” (p. 155).

science, but also different political responses to climate change” (O’Brien, Eriksen, Nygaard, & Schjolden, 2007, p. 74).

For some scholars, the IPCC climate change framework is reconfiguring new discourses and policy approaches to poverty and development. Chandler (2010) argues that under an “adaptation agenda” the key question in terms of policy-intervention is not “are you reducing poverty? But, are you decreasing people’s vulnerability to climate change?” (p. 162). He argues that, this agenda “brings together the concerns of poverty reduction and responses to climate change by understanding poverty not in terms of income, or in relation to social and economic development, but in terms of ‘vulnerability to climate change’” (Chandler, 2010, p. 163). As I discuss further in this dissertation, climate change researchers second those criticisms by questioning whether adaptation strategies are addressing the underlying factors that are causing vulnerability in poor communities, or if those initiatives are just focusing on responding to the impacts of climate change (Schipper, 2007; Christoplos, Anderson, Arnold, Hedger, Klein, & Le Goulven, 2009; Parry, Hammill, & Drexhage, 2005).

In particular, my dissertation echoes some of the few analyses on adaptation initiatives in Mexico which highlight inequality and power relations, and criticize the technological approach to climate change (McEvoy & Wilder, 2012; Manuel-Navarrete, Pelling, & Redclift, 2011). McEvoy & Wilder (2012) analyze the Arizona–Sonora binational desalination project, an adaptation initiative, concluding that

Our critical risk analysis shows that the associated (and unintended and under-examined) consequences of desalination are likely to exacerbate

existing inequalities and introduce new vulnerabilities by compounding the water-energy nexus, increasing greenhouse gas emissions, inducing urban growth, producing brine discharge and chemical pollutants, shifting geopolitical relations of water security, and increasing water prices (p. 361).

The authors criticize that the desalination project represents a technological fix to the water problem, putting aside more structural measures such as conservation measures, or addressing issues that may “question the growth paradigm that drives regional water policy” (McEvoy & Wilder 2012, p. 358). In their study on adaptation to hurricanes in the Mexican Caribbean, Manuel-Navarrete et al. (2011) analyze the existence of a prevalent vision supporting mass tourism growth and favor technical “band aid” adaptation solutions such as the building of robust hotels, implementing beach restoration technology and improving early warning systems. This approach to adaptation, they argue, “increases social inequalities, degrades ecosystems, and amplifies overall exposure to extreme events” (Manuel-Navarrete et al., 2011, p. 249). My research also draws on the vulnerability literature that points at the multiple factors determining climate change vulnerability and adaptation in Mexico (Liverman, 1990; Liverman & O’Brien, 1991; Eakin, 2005; Tucker, Eakin, & Castellanos, 2010).

My approach to environmental narratives has also been informed by environmental sociology scholarship that discusses how environmental issues are problematized and considers “the social authority of different claims about the environment” (Woodgate, 1997, p. 1). In particular, my discussion of government narratives draws on the literature that elaborates on the construction

of global truth and rights regimens of the environment and natural resource use; on the making of hegemonic forms of rationality that translate into new effects of government; and with regard to the ways in which environmental science is constructed so as to target populations, production practices, and behaviours, vis-à-vis nature (Goldman, 2004; Taylor & Buttel, 1992). Key topics in this analysis are the production of local environmental knowledge by indigenous populations, the variation of knowledge across classes, gender, age, and the question of who generates and applies knowledge and for what aims. I analyze environmental sociologists' debates about "how environmental knowledge is constructed and deployed by different stakeholders in environmental debates" (Woodgate, 1997, p. 2).

This dissertation relies also on discussions in environmental sociology and related approaches that challenge existing approaches to intellectual and scientific inquiry that historically have been universalist, that have ignored the heterogeneity and difference inherent in social reality (Gandy, 1997; Watts & Peet, 2004; Darier, 1995). As Gandy (1997) explains, this critique conveys "a greater sensitivity to the limits of knowledge and to the need to open up intellectual debate to a broader array of actors and perspectives" (p. 154). My research engages this debate by illustrating the existence of a plurality of interpretations about nature and local environmental changes.

Finally, my analysis of narratives is broadly informed by Mexican political ecology scholarship that critically elaborates on the interconnection between dominant capitalist rationalities and the deterioration of environmental

degradation, on the crisis of productive-driven rationalities and knowledge systems that support economic growth strategies that externalize ecological impacts (Leff, 1994; Lezama 2004). In their analysis, scholars highlight the need to shift towards the construction of a new productive rationality, to an “alternative modernity” based on universal values such as social equality and an ecological sustainability (Leff, 1994, p. 12). This dissertation is also influenced by Mexican anthropological studies of the society-nature relationship, which analyze how factors such as culture, politics and economy shapes local inhabitants’ perceptions of nature, of natural resources use and access, and of the social organization necessary to manage them (Toledo & Argueta, 1993; Paré, 1995). My analysis of the interrelation between fishers and their resources has been influenced by studies in political anthropology that look at conflicts of interest among various stakeholders, analyzing power relations and historical processes by which actors are constituted, their territories, their identity, their practices and interests that give rise to conflicting socio-political projects on the ground (Paz, 2002; Paz & Vázquez, 2002).

1.3.2 The Making of Policy Problems

My research elaborates on ideas from policy analysis, development studies and Science and Technology Studies (S&TS), which analyze the interrelation of politics and knowledge and the “inherently normative and interpretive character of policy problems” (Fischer, 2003, p. 11). Scholars from these fields look at the processes and contexts through which policy problems are “naturalized”

(Marston, 2004). A core argument both fields share is the questioning of the “value neutrality” of policy problems and the science on which these rely.

1.3.2.1 Expert Knowledge Legitimizing Climate Change Interventions

The analysis of climate change narratives sheds light on the intersection between knowledge production and policy-making. S&TS scholars argue that the science and politics of climate change are not separate domains, but rather that they are strongly intertwined because, as Demeritt (2001) explains: “Not only has the science of climate change largely driven national and international politics of climate change, the politics in turn have also influenced the practice of that science” (p. 308).

S&TS scholars have examined how science has become the dominant frame, or “epistemic authority,” for understanding climate change (Edwards, 2001; Miller & Edwards, 2001; Jasanoff, 1996; Jamison, 1996; Norton & Suppe, 2001; Yearly, 1996). Climate change has not only been “unveiled” by science but also – since the mid-1980s – has been considered one of the most important environmental problems to be solved worldwide. However, it is important to highlight that S&TS scholars have also pointed out that this strategic role of science and scientists in the making of the international climate change regime has been questioned around the world (Miller, 2001, p. 478). Miller explains that different actors – scholars, non-governmental organizations – have raised important contentious issues such as: “What counts as legitimate knowledge?

Who speaks for nature? How much power and authority should be accorded to science relative to other modes of knowing and deciding?” (Miller, 2001, p. 479).

S&TS studies have also analyzed the role of political institutions as important agents in posing problems to be solved, as well as in determining the nature of the techniques of management and control to be used in the process of researching such issues (Jasanoff & Wynne, 1998, p. 5). Demeritt (2001) explains that in the process of promoting “science for policy,” governments are also shaping “the formulation of research questions, choice of methods, standards of proof, and the definition of other aspect of ‘good’ scientific practice” (p. 308). In this dissertation I analyze the role of governments in using science as an authoritative source to legitimize state interventions. I illustrate how scientists’ influence in framing problems and decision-making processes are importantly determined and constrained by state power. My work aims to contribute to understandings of the science-policy interface by discussing how government officials – the “fourth government branch” (Jasanoff, 1990, p. 3) – and institutions enhance or restrict scientists’ roles – or technical experts, the “fifth branch” (Jasanoff, 1990, p. 3) – in framing problems and their solutions.

According to Yearley (1996) “environmental policymaking has turned out to be a particularly favorable arena for the operation of science advisers because many environmental problems have only been drawn to our attention in the first place through the specific cognitive apparatus of science” (p. 198). However, in this dissertation I discuss and question this role attributed to scientific advisers. By looking at the government sphere, my work puts the role of scientists into

perspective: I argue that even though the role of scientists is key, the role of government officials in framing and presenting the climate change problem publicly has been just as important. Government officials decide how and what kind of scientific data they are going to use to present and frame the problem, putting forward their own views on how to frame the issue. In my study the voices of scientists have not always been incorporated in government climate change narratives and initiatives, regarding for example (i) scientists' understanding of some characteristics of the climate change problem and solutions, as well as their interests in preserving scientific accuracy in what has been said about the problem; (ii) their concern in highlighting issues of climate change predictions and; (iii) their use of alternative scientific frameworks to explain environmental changes – such as coastal erosion – that government narratives attribute to climate change. In what follows, I analyze this problem by applying three concepts used in S&TS studies: boundary work, epistemic communities and coproduction.

Boundary Work

Boundary work is a concept used in science studies to describe the process by which scientists aim to legitimate their work and separate it from other types of knowledge and agents – from non-scientific/expert knowledge and from governments. It has been defined as

the attribution of selected characteristics to the institution of science (i.e., to its practitioners, methods, stock of knowledge, values and work organization) for purposes of constructing a social boundary that

distinguishes some intellectual activity as non-science (Gieryn, 1983, p. 782).

Miller explains that boundary work also intends to separate “scientific and political domains of authority and action” (Miller, 2004, p. 59); or as Gieryn (1983) explains, it is forged with the aim “to protect the autonomy of scientific research from political interference,” among other objectives (p. 781). Boundary work “occurs as people contend for, legitimate, or challenge the cognitive authority of science – and the credibility, prestige, power, and material resources that attend such a privileged position” (Gieryn, 1995, p. 405).

Although this is a concept that explains scientists’ practices, in my dissertation I use it to show how government officials are actively doing boundary work. My case illustrates that scientists are not the only agents making “ideological efforts” to separate themselves from other spaces and actors. Government officials, who are providing the institutional setting and conditions, reinforce this process as well. I argue that boundary work is strategically promoted in governmental spheres as part of the process of legitimating climate change interventions based on scientific facts. “Purification” (Latour 1993) is a necessary step towards the accomplishment of that goal.

In Mexico, the majority of provinces and some municipal governments are designing Climate Change Programs – as part of the Mexican government’s international commitments and climate change agenda – with the main goal of evaluating vulnerability to climate change and proposing mitigation and adaptation policies and projects. The government leads this process and with it establishes the conditions for the emergence of boundary work.

Mexican governments do boundary work through the establishment of committees that design and propose climate change plans and initiatives. Within these committees – constituted by sectors such as entrepreneurs, non-governmental organizations, and government agencies – it has been the scientific group who has been assigned the task to diagnose the problem and its possible solutions. In this case, the process of attributing to science “a cognitive authority” (Gieryn, 1995, p. 405) is an important step in the process of legitimating government interventions. The boundary made between scientists and other actors delimits who has the right to speak about climate change, to define it and to provide solutions. Outside of the boundary delimited by government agencies are non-expert agents (some local non-governmental organizations) whose understanding of the climate change problem is contentious and problematic for government authorities. As I explain further, outside of the boundary are also other kinds of experts – e.g. geologists – who provide different scientific frameworks to explain environmental changes.

Epistemic Communities

In Mexico, climate change is an issue that responds to an international agenda that requires an active mobilization of public efforts to fulfill the many commitments the government has acquired. As part of various strategies to reach its goals, the government has been instrumental in providing the conditions for the formation of a national epistemic community (Hass, 1989) that supports

the generation of knowledge and narratives that sustain the climate change agenda.

The concept of epistemic communities elaborates on how experts use authority to persuade other people to adopt ideas and to agree to create new environmental regimes (Miller, 2001, p. 248). Studies of epistemic communities, Miller and Edward explain, “identify the authoritative knowledge claims of experts as a significant ‘power resource’ in influencing the construction of environmental regimes” (Miller & Edward, 2001, p. 4). This approach explains that “new forms of social order emerge from the development of shared ideas among government officials, scientists, and citizens around the planet” (Miller, 2001, p. 248).

However, this approach is challenged by scholars (Miller & Edwards, 2001; Miller, 2001; Jasanoff, 2001) who explore the emergence of ideas but also “how particular ideas come to be shared in the first place” (Miller, 2001, p. 249). Miller (2001) explains that “rarely do people adopt convergent ideas and then decide to band together in communities or form new institutions; rather, they come to share ideas as a result of social interactions that help constitute the community in the first place” (p. 249). The key argument, then, is that ideas do not emerge in a vacuum but are part of a web of institutions and practices that allow the emergence of such communities. In this case study the government has been a key actor in the creation and coordination of networks and institutions in which social interactions are taking place. The Mexican experience reinforces S&TS perspectives that suggest environmental problems such as climate change

emerge from an interplay of scientific discovery and description with other political, economic and social forces. Persuasive accounts of

environmental phenomena are constructed, according to this view, by myriad social interactions, encompassing not only the diverse activities and practices of scientific communities, but also the work of nonscientific actors and institutions in defining problems and endorsing solutions (Jasanoff & Wynne, 1998, p. 3- 4).

1.3.2.2 The Science-to-Policy Framework in Climate Change Research

The role of scientific expertise in making and legitimating claims about climate change have also been analyzed by scholars discussing the science-politics interrelation within the IPCC. Beck (2011) argues that the IPCC is based on a “linear model of expertise” in which the science-politics interrelation is conceived as “unidimensional, linear, and one-way: from science to policy” (p. 298), as it is in the classic model “truth (facts) speaks to power (values)” (Jasanoff & Wynne, 1998, p. 8). This model is based on the assumption that “knowledge is a necessary (if not sufficient) basis for decision-making” (Beck, 2011, p. 298). Beck (2011) explains that this model conveys propositions such as that: (i) more research will necessarily lead to more certainty (the linearity of knowledge production); (ii) more and better science will help solve political disagreements (science as harmonizing force); and (iii) science makes evidence-based policies (p. 298). This model assumes a “positivist understanding of science’s relationship to politics” (Carter, 2013, p. 26) holding classic assumptions of the separation of science from politics where “[v]alue judgments [are] thought to be limited to politics, whereby the provision of scientific advice [is] understood to be value-free and scientists politically neutral” (Carter, 2013, p. 26).

Scholars explain that the adoption of this model responds to the fact that the very emergence, positioning and consolidation of climate change in global politics have been determined by their promoters' capacity to provide sound science data to validate the existence and impacts of climate change vis a vis global-warming skeptics (Beck, 2011; Edwards, 2001; Norton & Suppe, 2001; Shakley & Wynne, 1996). Therefore, scientific-expertise has been the basis that sustains climate change claims and this includes the strategic use of scientific data and devices.

The creation of computer models as boundary objects has been instrumental in efforts to posit climate change in policy design (Edwards, 2001, p. 54). Boundary objects are "relatively stable and reproducible things, people, projects, texts, maps, and ideas that facilitate the articulation between different actors or 'social worlds'" (Shakley & Wynne, 1996, p. 279). Computer models, maps and indexes, are among the various boundary objects created as climate change emerged and was positioned as a global problem. Edwards (2001) highlights these objects' relevance when he argues that without computer models "we would be unable to understand the climate system as a single, integrate whole, and discern the effects of policy decision" (p. 42). Therefore, as Norton and Suppe (2001) explain, computer models are "absolutely essential in the efforts of atmospheric scientists to represent the earth's climate and its possible evolution" (p. 67). Hulme (2010) describes the emergence of the first global-mean temperature index as another key object in the making of global knowledge claims that has also been instrumental in policy-making because it "offers a

number around which the normative goals of international climate diplomacy can be stabilised: witness the citation in the Copenhagen Accord of 2 degrees Celsius as the increase in global-average temperature below which climate change ‘should be’ limited” (p. 560). Measurement of greenhouse gas emissions is another boundary object with “high political significance” since it is a means “for assigning blame for changes in the climate and therefore for assigning responsibility” to take action (Miller, 2001, p. 489).

S&TS scholars have criticized the IPCC science-to-policy framework. Rather than conceive such interface as a “one-directional knowledge transfer from science to policy” (Wesselink, Buchanan, Georgiadou, & Turnhout, 2013, p. 2) these scholars argue that policy is immersed in a coproduction process where the “scientific and political order are simultaneously created and recreated so as to sustain each other through complex rituals of interdependence” (Jasanoff, Markle, Petersen, & Pinch, 1995, p. 527). Coproduction is an approach that helps us

avoid the trap of imagining that activities taking place in those domains labeled as ‘scientific’ are somehow free of concerns about values, power, and order, while activities taking place in domains labeled as ‘political’ are somehow not involved in the production of knowledge... Science is surely political in the sense that its activities shape the distribution of power in modern societies (Miller, 2001, p. 482).

Coproduction then points to the existence of a dual process referred to as the “scienticization” of policy on one hand, and the “politization of science” on the other (Huiteima & Turnhout, 2009). This dissertation aims to analyze this dual

process by discussing the role of state agencies and officials as key agents in the instrumental promotion of science and scientists, and in restraining and orienting their actions. As I discuss in this dissertation, there are some government practices that at times position the government as a key agent in shaping climate change discourses, representations and practices. In this context, knowledge claims are not translated directly into political decisions and scientists are not “the ultimate power holders” but “it is the governments that decide which policy to develop and which knowledge to use” (Grundmann, 2007, p. 416).

1.3.2.3 State Power in Coproduction Processes

Ethnography of development provides a perspective that illustrates an interesting characteristic of the interface science-policy: the role of power relations. Mosse (2005) argues that policy recipients or “beneficiaries” shape development interventions through practices. In this case I define scientists as “policy-recipients” since they are receiving public funds for conducting policy-oriented research commissioned by government agencies. Scholars state that it is important to recognize the important role of policy beneficiaries, their “collaboration and complicity,” since they “understand and manipulate the rhetoric, rules and rewards of aid delivery” (Mosse & Lewis 2006, p. 4). In my case, scientists are actively involved in policy-making since they are defining problems and solutions, or as Mosse puts it, they “establish rules and norms, develop strategies and form judgments” about climate change initiatives (Mosse 2004, 658). Therefore they are not passive but active actors shaping policy

through their practices. However, as Mosse explains, we need also to recognize the prevalence of power relations in policy-making:

[w]hile this [recipients shaping policies] is true, the problem is that it does away with the asymmetries of power that ensure the need to register desires and aspirations, to retain legitimacy, to access resources and reputation by translating one set of thought-actions into another – the capacity for which is unevenly distributed (Mosse, 2004, p. 658).

Therefore I argue that it is important to recognize the existence of “asymmetries of power” while analyzing processes of coproduction. Scientists’ participating in climate change initiatives by providing data and doing analysis are not necessarily determining how to present and frame the problem, who participates, or what issues should be prioritized; some of their proposals to address the problem are not integrated as part of government narratives either.

1.3.3 State Interventions in Development Studies

This dissertation discusses some characteristics of state interventions – specifically “improvement” schemes (Li, 2007) – in the light of theories and perspectives from development studies. It also draws on studies that analyze the rationale of government interventions, which look at “what they seek to change, and the calculations they apply” (Li, 2007, p. 1).

Models and Practices

My general approach to development draws on ethnographies of development that highlight the need to look at the relationship between models, on one hand, and the practices, events, and material outcomes that these models are

expected to generate or legitimize, on the other. Scholars from this perspective (Olivier de Sardan, 2005; Mosse, 2005; Mosse & Lewis, 2006) point to the need to look at “the social life of projects, organizations and professionals, the diversity of interests behind policy models and the perspective of actors themselves” (Mosse & Lewis, 2006, p. 5). This perspective highlights the relevance of analyzing the way written initiatives are implemented and negotiated on the ground; in this approach, scholars do not take for granted the existence of a direct and nonfluid relationship between theory and practice, but they look at the many ways those ideas can unfold in practice.

I analyze climate change interventions as development discourses.⁸ Deconstructivist approaches define development as a historic discursive formation that emerges from certain forms of knowledge and that produces particular forms of subjectivities (Escobar, 1995, p.10). From this perspective, based on Foucaultian notions of power and discourse, development discourses are conceived as practices (Ferguson, 1994, p. 18). They are discourses that result “in concrete practices of thinking and acting through which the Third World is produced” (Escobar, 1995, p. 11). From an ethnographic perspective, discourses of development are also conceived as “practice and theory – material activity which transforms nature and society and the modes of thought that inform this action” (Gasper and Apthorpe, 1996, p. 4). From these perspectives, then, it is clear that there is a need to go beyond the idea of discourses as ideological

⁸ Hajer and Versteeg (2005) define discourse as “an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through and identifiable set of practices” (p. 175).

statements and to explore how they are produced, put into practice and the kind of intended or “unintended” results they generate (Ferguson, 1994).

My analysis also draws on studies of development narratives that explore how certain narratives persist over time, and have a predominant position even though some facts in the field evidence their failure (Scott, 1998; Roe, 1991). I adopt Roe’s approach to development narratives. He explains that they

tell scenarios not so much about what should happen as about what will happen according to their tellers – if the events or positions are carried out as described. Even when their truth-value is in question, these narratives are explicitly more programmatic than myths and have the objective of getting their hearers to believe or do something (Roe, 1991, p. 228).

This dissertation reconstructs the story-lines implicit and explicit in government initiatives and texts, as well as in verbal narratives, and considers the definition of problems and events that are justifying government interventions. It identifies the process of simplification (Scott, 1998) taken up within projects so government officials can structure the unstructured social reality they aim to change.

My research also relies on scholarship on development interventions. In particular I illustrate their “anti-political” nature, a process by which complex political issues become depoliticized and reduced to technical problems (Ferguson, 1994, p. 267). Li (2007) uses the idea of “rendering technical” to refer to mechanisms through which experts and policy-makers “exclude the structure of political-economic relations from their diagnoses and prescriptions” (p. xx). I discuss these concepts in light of fieldwork findings indicating the existence of competing views about environmental changes embedded in conflicting

relationships between fishermen and the oil industry. I analyze climate change government narratives that on one hand recognize the existence of historical economic, political and environmental processes explaining the emergence of environmental changes and vulnerability to climatic changes, but that on the other hand are proposing solutions devoid of mechanisms to address structural causes and that ignore the historical local contexts in which these initiatives are going to take place.

In this same line of analysis, I use Scott's ideas on processes of "legibility" and "simplification" in which state interventions design "large-scale social engineering" initiatives (Scott, 1998, p. 5). As a result, such initiatives are "more static and schematic than the actual social phenomena they presume to typify" (Scott, 1998, p. 46). I analyze how simplification takes shape through climate change initiatives and the "unintended" (Ferguson, 1994) political and social consequences of such "narrow visions" of social relations and processes (Scott, 1998).

Finally, it is important to explain that in my interpretations of climate change narratives, and of fishers, government officials and scientists' multiple interrelations, I use a Foucaultian notion of power. Foucault explains that power is not possessed or held, but rather circulates via networks that work through and produce different bodies, discourses, institutions and practices (Rutherford, 2007). Power is located and exercised from and through countless sites, practices, agents, discourses and institutions. Foucault states that power cannot be seen as emanating only from above. Rather, it comes from below working

through webs of different power relations. Foucault invites us to de-center the role of the state; the process of government, “the conduct of conduct,” is, rather, adopted by a wide range of social actors (Agrawal, 2005).

In particular, I use this poststructuralist idea of power in my analysis of subject-making. However, in my analysis I consider subjects not as a pre-existing category; I argue that subjects are not only a product of discourses but they are also agents that act back, that hold counternarratives and have practices that challenge “dominant” discourses of environmental changes. Therefore, I adopt Long’s definition (1990) of social actors as entities that

are not simply seen as disembodied social categories (based on class or some other classificatory criteria) or passive recipients of intervention, but active participants who process information and strategize in their dealings with various local actors as well as with outside institutions and personnel (p. 7).

This dissertation analyzes the complex means and ways of how interactions among actors take place, as well as the historic processes that have shaped actors’ perspectives and practices.

1.4 Thesis Organization

In the next chapter (2) I first explain the methodology, fieldwork instruments, and organization plan implemented during my research. I also conduct a detailed analysis of the methods and epistemological positions adopted to interpret my research findings. In Chapters 3 and 4 I present a close analysis of communities’ findings. Chapter 3 is divided in two sections. In the first section I explain the origin of climate change within the government agenda and highlight some of the

most relevant characteristics of the process of positioning climate change in government policies and initiatives. In the second section I introduce my case study, the political-economic context of the coastal communities and region in which this dissertation is based. I present a detailed characterization of these sites, with special focus on fishers and their organization.

In Chapter 4 I discuss how coastal erosion is explained and understood in government, scientific and fishers' narratives. I analyze the implications of adopting climate change frameworks to explain local changes such as coastal erosion. Chapter 5 is dedicated to identifying the characteristics of an emergent development/climate change narrative. I base my analysis on some of the problems pointed out in government documents that discuss coastal communities' conditions and risks under climate change scenarios. I discuss the governments' adaptation measures proposed in projects and policies in light of local political and environmental problems discussed with local fishers and authorities.

Chapter 6 offers a broader characterization of climate change government narratives and scientists' perspectives at the national level. I analyze contentious topics identified by scientists during my interviews – which have also been discussed in international climate change organizations, and taken up by climate change scholars. Finally, Chapter 7 is dedicated to discussing the conclusions of this study. Here I take up my research questions to guide the discussion on the implications of using global climate change frameworks to explain local environmental changes.

CHAPTER 2. METHODOLOGY

2.1 Introduction

This chapter discusses the methodology I used in the development of this dissertation. In the first section I describe the network of actors on which this research is based and in the second section I discuss my dissertation's approach.

2.2 Case Study Analysis

This dissertation is based on case study analysis – one of the research strategies used in social qualitative and quantitative analysis. A case study is “a specific approach or strategy that can be used as a unit of analysis and also the means by which data have been gathered, organized, and presented” (Wolff, 2007, p. 32). In this research I employed a multi-method approach; I conducted interviews, analyzed archival materials and planning documents, and also engaged in direct participant observation. My research included one exploratory fieldwork stage in May-June 2011 and two fieldwork periods, the first in November-December 2011, and the second in May-July 2012. Table 1 shows the total number of interviews carried out during these periods and the types of actors included in this study:

Table 1. Total number of interviews during three fieldwork stages (2011 and 2012). People interviewed from local, provincial and national communities, government institutions and organizations.

Actors	Number of Interviews
Fishers from five communities	90
Leaders of fishers and the local community	8
Government Officials	14
Scientists	13
Non-governmental organizations	6
Private Consultants	1
Journalists	1
Total	133

This research looks at three particular networks: I) coastal communities – specifically the groups of fishers; II) the government – national and provincial – and its policies and programs and; III) the community of experts and scientists who are working in the Gulf of Mexico and are members of academic institutions and non-governmental organizations.

Coastal Communities in the Gulf of Mexico

This case study analysis is based on five coastal communities in the Southern Mexican State of Tabasco, in the Gulf of Mexico (Figure 1). Tabasco is located in the delta of two of the most important basins of the country; due to its extension and the volume of water it produces (33% of the national freshwater production), this delta is one of the most important in North America, and is the seventh most important worldwide (Mendoza, Arevalo, & Inda-Diaz, 2013, p. 120). It is a humid tropical lowland region, with extensive swamps and lagoons: 28% of Tabasco’s territory constitutes wetlands and 53% of Mexico’s freshwater swamps are located in this province (Barba, Rangel, & Ramos, 2006). A large percentage of

its territory is situated 10 meters above sea level, and large parts of coastal wetlands are located at -1 meters below sea level (Gama, 2008, p. 7). Approximately 30% of the territory – grazing marsh – is periodically inundated (Gama, 2008) (Figure 2).

Figure 1. Site of the Study, Province of Tabasco, in the Gulf of Mexico, Mexico.



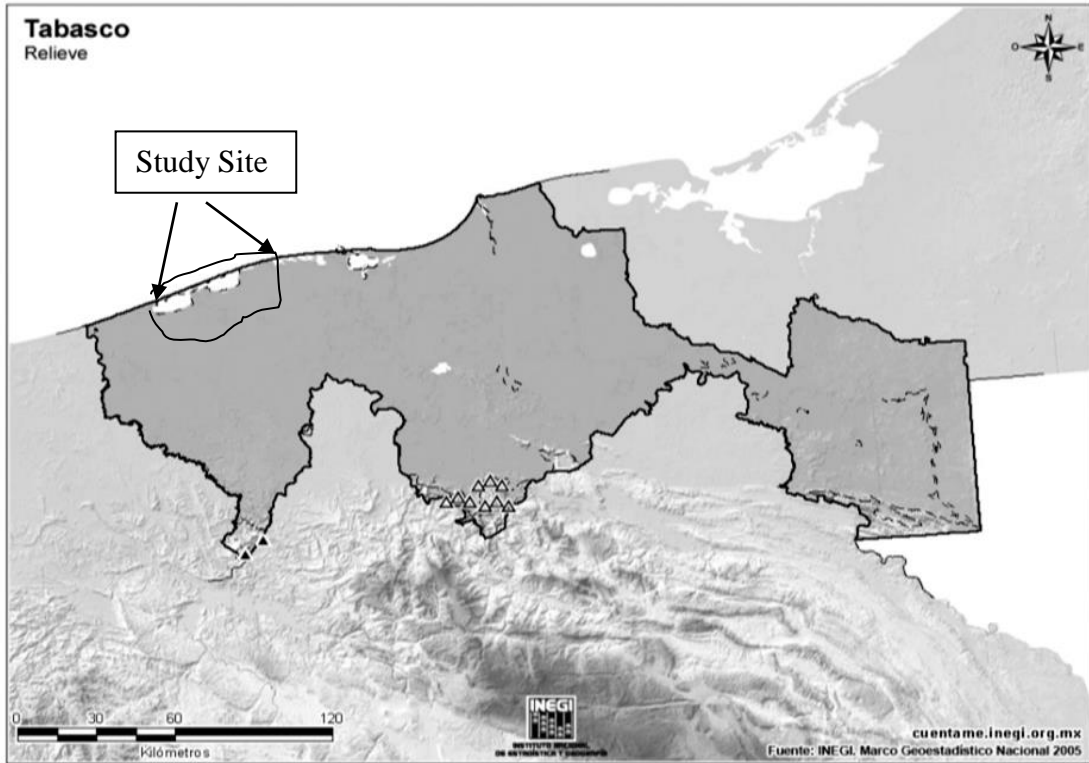
Source: Modified from Wikimedia Commons. 2014.

Figure 2. Wetland vegetation in the study region.



The coastal communities are located on a barrier island, defined as the “elongated, shore-parallel accumulations of unconsolidated sediment... that are separated from the mainland by bays, lagoons, or wetland complexes” (Hayes, 2005, p. 117). These communities are located on a long tiny strip of land that divides the sea from three continuous coastal lagoons. These communities are essentially settled on a kind of island, because along the strip there are two openings – one natural and the other artificial – at each extreme end of the territory (Figure 3 and 4).

Figure 3. Map of Tabasco, the Study Site and of the Carmen-Pajonal-Machona Lacunar System.



Source: INEGI, 2014

Figure 4. Map of the Carmen-Pajonal-Machona Lacunar System and Study Area



Source: Gutierrez & Galaviz 1983.

The research site for my study was selected based on three important factors: a) this region has been characterized as “highly vulnerable” to climate change due to coastal erosion; b) these communities are located in an area that historically has been affected by the Mexican oil industry and; c) these communities are part of an area located within a coastal wetland – a coastal lagoon – which is one of eight pilot sites that the Mexican government selected for the implementation of adaptation projects with the aim to “decrease the coastal region’s vulnerability” to climate change (Buenfil, 2009).

Scientists and government officials identified and defined these communities as places “highly vulnerable” to climate change impacts. This vulnerability, it was explained, was based on high rates of coastal erosion, a phenomenon resulting from sea-level rise. This was the fundamental criteria to select the case, since my core research question was precisely to understand how actors – government officials, scientists – defined and framed climate change; the fact that they define a specific site as vulnerable to that particular environmental change allows me to identify and discuss the factors and characteristics they attribute to climate change, how they understand it and frame it. Another important feature is these communities’ location within an oil production and transportation area. The intersection of a wide diversity of social changes – economic crisis, environmental changes, and the effects of oil pollution – determine the complexity of analyzing this area in the light of climate change and adaptation issues. Finally, my case study is part of a pilot site project – promoted by governments, international organizations and other countries –

aiming at designing and implementing adaptation strategies. The reports and texts that resulted from these types of initiatives gave me the opportunity to analyze written narratives about the topic.

According to scientists, climate change is already having concrete impacts on coastal ecosystems, and will affect local fishers in particular, due to permanent changes in species reproduction and distribution, among many other impacts. Therefore groups of local fishers are the main focus of this research, since they are the agents on which those environmental changes have the most direct impact. Through qualitative research techniques I analyzed fishers' understandings of climate change and other environmental changes. I explored their perception and experiences of different environmental problems and their understanding of the processes causing them.

My entry into these communities was facilitated by the contacts that researchers from the National University of Mexico have in some communities. After years of conducting various kinds of studies, members of the Sea Sciences Institute have gotten to know local fishers and established formal and informal connections with them. I also used the contacts provided by one of my supervisory committee members, who has been working in this region for several years. Through these contacts I made a first approach to the communities, and afterwards I used a snowball technique to get in contact with other fishers. I also interviewed local leaders and other key members of the communities, such as political party leaders and local teachers. Through interviews and archival material I reconstructed some of the social, political, economic and

environmental developments in the history of the place. Figures 5-9 show the study communities.

Figure 5. Study community in Tabasco.



Figure 6. Study community in Tabasco.



Figure 7. Study community in Tabasco.



Figure 8. Study community in Tabasco.



Figure 9. Study community in Tabasco.



Governments and Policies

Through semi-structured interviews and archival analysis, I reconstructed governments' paths to mainstreaming programming around climate change adaptation. I interviewed members of government agencies from different organizational levels – national and provincial – with the aim of investigating how planners imagine or envision climate change and adaptation in their initiatives and projects.

At the national and provincial level, I interviewed government officials from environment, agriculture and health agencies involved in designing adaptation plans.⁹ Within each Ministry I looked at the different bureaus in charge of adaptation projects, their specific tasks, and the perceptions government officials have about the problem. Other governments – at the provincial level – are also important for understanding the trajectory of adaptation plans in Mexico. A significant case is Mexico City's government, which has taken the lead in designing adaptation projects and has also designed its own methodologies and strategies to prepare those plans. In this case, I interviewed a government representative in charge of the environment office.

At the provincial level – the Mexican province of Tabasco – I interviewed officials who participated in organizing the Climate Change Committee, who are in charge of designing adaptation plans at the provincial level. Government officials, scientists from local universities, and members of NGOs participate in that committee. At the local level I interviewed fishing authorities that provided

⁹ During the last ten years, the Public Health Institute has played a key role in analyzing, providing information, and discussing climate change impacts and adaptation in Mexico.

information and views on local fishing production, organization and main problems.

Archival analysis is based on planning documents and materials, primarily the following government reports:

- a) The Fourth and Fifth “National Communication to the United Nations Framework Convention on Climate Change” released in 2010 and 2012, respectively, by the National Institute of Ecology and Climate Change of the Ministry of Environment (CICC, 2012b). These reports are part of the commitments Mexico acquired as a Non-Annex I Party to the UFCCC, and contain an inventory of greenhouse gas emissions, the results of studies on the country’s vulnerabilities to climate change, and the progress of mitigation and adaptation programs. They are key reports that assemble many different government climate change initiatives and actions. They also report on the variety of studies made by universities and research centers at the national level.
- b) “Climate Change Adaptation in Mexico: Vision, Elements and Criteria for Decision-making,” is a report released in 2012 by the National Institute of Ecology and Climate Change of the Ministry of Environment (CICC, 2012a). This report explains vulnerability to climate change impacts in Mexico. It is presented as a policy instrument and “a guide for decision-making actions towards the strengthening of national adaptation capacities” (CICC, 2012a, p. 19). It includes conceptual frameworks and discusses some of the country’s first efforts in adaptation initiatives.

c) In 2009, the Inter-Institutional Climate Change Commission (ICCC) released the “Special Climate Change Program 2009-2012” (CICC, 2009). Containing 105 objectives and 294 goals for climate change, this document is described as the most challenging project the government has taken up to now. This is a government instrument that specifies with more or less concrete actions the ideas outlined in the National Climate Change Strategy.

d) The “National Climate Change Strategy” was released in 2007 by the ICC (CICC, 2007). It is an umbrella document that identifies measures to mitigate and proposes the different studies needed to be able to define mitigation goals. It also discusses ideas about how to carry out adaptive capacity building.

e) The Ministry of the Environment released “Climate Change in Rural Communities” in 2008 (SEMARNAT, 2008). It is described as a climate change manual for local promoters, offering practical knowledge so they can help local rural inhabitants in their thoughts and views about how to better adapt to climate change. This was an important report to analyze since it is the only document that explicitly addresses rural areas.

f) In 2011 the provincial Ministry of the Environment presented the “Tabasco Climate Change Action Plan” (SERNAPAN, 2011), which contains an inventory of greenhouse gas emissions, vulnerability assessments, and mitigation and adaptation measures to be implemented in the province.

g) The project “Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico” is an initiative promoted by agencies such as the Global Environmental Fund through the World Bank. The initiative’s goal is to promote

adaptation to the consequences of climate impacts in eight pilot sites “through the implementation of pilot measures that would provide information on the costs and benefits of alternative approaches to reduce their [coastal wetlands] vulnerability” (World Bank, 2008). This project was designed in 2008, and it is analyzed in this dissertation because my case study includes the fishing communities that are part of one of these pilot sites selected in this project, the Carmen-Pajonal-Machona Lacunar System.

Scientists

I interviewed scientists working in the Gulf of Mexico to explore how they understand climate change and adaptation. I met scientists from the National University of Mexico who have been working on the region – mainly members of the Atmosphere Sciences Institute and the Sea Sciences Institute. I also interviewed researchers from the local University of Tabasco working on the Climate Change Provincial Plan. I also talked to scientists from other local universities who were involved in writing provincial climate change plans, particularly from the provinces of Morelos and Puebla.

I interviewed other scientists working on the topic of climate change, and some of them working actively in government initiatives. Specifically, I interviewed researchers from the National University of Mexico who during the last decade have been working with peasants to implement adaptation projects in the State of Tlaxcala. I also met scholars who have studied how local peasants are adapting to climate change in the State of Chiapas. I interviewed scientists

who were working closely within government projects as advisers, who worked in private research organizations. I also met researchers from a national research center located in Tabasco's capital city, who are working on coastal communities. I analyzed these scholars' publications, articles, books and reports.

Other Organizations

To complement my analysis I interviewed other relevant actors, such as non-governmental organizations members. There are two NGOs, both national and provincial, that have been working in the study region. Oxfam-Mexico has worked in the province addressing flood problems and has been discussing planning issues with government officials. There is another important organization working on coastal erosion within this region – the Association for Research and Development, based in the State of Morelos. They are monitoring the rise of sea levels and its impacts on oil infrastructure.

I also met with two local non-governmental organization members; one of them is a member of the climate change provincial committee. The second organization was important to contact since government officials characterize them as a “radical” organization; this organization was not invited to be part of the provincial climate change activities organized by the government. Understanding how this organization's members think about environmental changes in Tabasco was an important task; interviews with these members provided me with a more or less comprehensive picture of the different local

political dynamics, mainly between the provincial government and local organizations.

For confidentiality reasons in this dissertation I do not identify the interviewees using their names. Instead, I use their agency job position in the case of government officials, their affiliated university, research center or organization in the case of scientists, and their characteristic stratified and organizational position in the case of fishers (cooperative members, freelancers and private fishers).

2.3 Research Process and Approach

In case studies, “analysis is inductive by nature” since a main research goal is to capture “unexpected issues” that otherwise would be overlooked if one goes to the field with a predetermined set of theories, concepts and processes to analyze – deductive reasoning (Aaltio & Heilmann, 2010, p. 67). From other approaches however, a more or less defined theoretical approach should inform research design and instruments – interview guides – so researchers should “pursue focused discussion” of specific processes identified previously (Elger, 2010, p. 256).

My study followed a path of ongoing inductive-deductive analysis, which shaped the research process along the way by re-formulating research questions. The research set for my study case was selected based on its specific unique particularities, which at the same time were defined in relation to a broader theoretical analysis. An inductive process took place along the

implementation of qualitative instruments; my dissertation analysis was determined by the themes and problems fishers, scientists and government officials discussed. Furthermore, textual analysis also determined the set of themes discussed in depth in my field site and in my dissertation. Therefore, core research topics in climate change research and analysis that could have emerged in my research, such as social justice themes about the role of industrialized countries in causing climate change, were partially absent from my findings and discussion.

I frame, understand and discuss my research findings using a critical realism approach, which “combines an ontological insistence on the existence of objective natural and social realities with recognition of the socially constructed and fallible character of scientific knowledge” (Elger, 2010, p. 254). Critical realism reappraises the discussion of theory and reality, beyond the classic binaries of idealism/empiricism. Harvey explains that critical realism “embraces naturalistic explanations in the social sciences without ignoring, at the same time, the fact men and women, unlike natural entities, actively reproduce their social world” (Harvey, 2002, p. 163). It is argued that within this approach, reality is conceived as layered; reality, Morgan (2007) explains, “could be analytically distinguished into structures, the outcome of their complex interplay, and human experience, perception, or interpretation of those outcomes” (p. 1). I carefully avoid structural and constructivist determinisms; I aim to understand how economic and political structures shape, constrain and enable social action, perceptions and understandings. At the same time, I explain how actors’ agency

and practices, and the perceptions underlying them, at times reproduce and at times challenge those structures.

I use a political economy approach to address the interrelations of economic, social and political processes and factors, and the institutional structures and context that generate and reproduce them. I analyze those interactions in their spatial and temporal manifestations. Critical realism understands structures as entities with “real power and effects” (Elger, 2010, p. 254). Morgan (2007) explains that

although human action is central to social reality there are problems with reducing that reality solely to the beliefs and actions of the individual because it then becomes impossible to account for where beliefs come from, how actions and their goals are constrained, enabled, and conditioned, how goals sometimes fail, and why there may be unintended consequences (for the actor and for society at large) from the action, or lack thereof (p. 3).

However, this is not to say that structures mechanically function as causal determinants to explain social reality and social action. Critical realism also problematizes structural determinism, explaining the need to understand structures, cultures and their agential mediation as mutually dependent process. Scholars explain the idea of the “duality of structure and agency,” conveying the idea that

structures of social relations are not merely epiphenomena of social interaction, but have distinctive emergent and enduring properties that will constrain or enable different lines of action, although these properties may

then be modified by ensuing individual or collective action (Elger, 2010, p. 254).

In the implementation of research strategies, theorists of critical realism emphasize the need to do “explicit theorizing, identification of causal processes, appropriate contextualization, attention to temporal sequencing and interaction effects, and critical contextualization of actors' accounts” (Elger, 2010, p. 255). In my research I aimed to pursue each of these components to provide a comprehensive understanding of the research problem.

The case study is defined as one of many other qualitative research strategies used by interpretative research methods, which “produce descriptions and accounts about the ways of life of the writer and those written about” (Denzin, 2001, p. 7881). Here, it is important to state how I interpret people’s accounts and how I position myself in relation to them. I interpret actors’ – government officials, scientists and fishers – arguments through the lens of performativity. I understand these agents as “situated actors” who “are in the permanent business of re-negotiating, re-constructing, and intervening ‘performatively’ upon them” (Tsekeris, 2007). In adopting this interpretative stance I try to understand and make sense of fishers’ views “in terms of the meanings people bring to them” (Denzin, 2001, p. 7883). In my view, to be able to understand these meanings in my research site context one needs to understand the history of the communities; the state’s history of interventions in the form of public policies that have transformed these places’ social and physical landscapes; the institutional context; and the political, economic and

social structures and processes. Fishers' identities as shaped by their ethnic background, social stratification and occupation have been sources I also take into account to understand their positions and opinions. This approach allows us to second Bourdieu' idea about the rejection of the existence of a "universal subject" (Bourdieu 1989); qualitative analysis helps us visualize the diversity of positions, opinions and subjectivities.

An analysis of people's performativity highlights the existence of others whose perspectives, interests and practices are at stake and are relational to the subjects in which the research is based. In my case study, analysis of fishers' positions, negotiations and changing roles shed light on the subjects with which fishers interact. Fishers' performativity points at who the others are, their interests, and positions before them. At the same time, fishers implicitly or explicitly named, labeled and assigned specific roles to "others." In this way one is able to grasp their relational existence.

Fishermen as situated actors interacted with me as a researcher with a particular "intentionality" (Kompf, 2007). I was an agent who interacted and interpreted while holding specific gender, class, race, and cultural identities (Denzin 2001, p. 7882). During fieldwork I introduced myself as a Mexican student studying abroad, interested in understanding how different agents define and understand climate change. In the research process I recognize myself as a privileged middle class woman, who grew up in an urban context. I assume myself as an actor with specific social justice concerns about the conditions and lives of specific marginal groups. I decided to focus the analysis on narratives of

environmental change since a core concern I had was to question who were making them, and most importantly, what were the types of implications they would potentially have on the ground. I critically question predominant – and at times dominant – discourses on how fishers should work, live, interact, and organize. I am critical of frameworks that, under the veil of ideas about development, try to impose new understandings about local problems. At the same time, I wanted to know and understand what fishers thought about what has been said about them, and what were their views, histories and stories, which over time have been shaping their positions and perceptions.

In my interaction with fishers, during my interviews with them, it was clear for me that they saw me as a vehicle, as an agent who might be used to convey fishers' ideas, perspectives and interests to different agents, mainly government officials. Fishers thought of me as an actor of possible use who might bring them – directly or indirectly – different types of capital and resources, mainly economic, e.g. funding, market advice, etc. I have concrete examples that illustrate this idea. In one of my interviews, a private fisher asked me directly if having this interview will help him to solve his problems; if not, he said, he was not interested in having the interview. Other fishers also asked me very cautiously if I have any connection with government agencies, or if I was there to offer them some kind of government support. In interpreting my research findings I took into account the narrative strategies they used during our interaction.

There is another example of my interactions with fishers. As I explain in chapter 3, in the study communities I found three different types of fishers:

cooperative members, freelancers and private fishers. Each of these categories conveys a different type of individual, with different economic and political power within and outside their communities. In my interviews it was very clear that cooperative members and freelance fishers were much more open, friendly and willing to talk to me about their problems. However, I had a different reception from the private fishers. They were always, without any exception, cautious about what they said to me. They were very suspicious about my work in their communities and they always asked questions about what kind of information I was collecting and my reasons for doing this work. They checked my ID in detail. Most of the time they initially rejected talking to me, explaining the lack of time or other reasons. However, in the end they would give me the interview. It was clear to me that this attitude was closely related to their reputation within their communities of being corrupt, of exploiting other fishers' work, of benefiting from their connections to government officials to get funding, among others. Therefore, fishers' social position within their communities was an important factor determining the course of our interactions.

My relation with government officials brought about other types of reactions. In my view, in this case issues of legitimation and justification permeated their positions and understandings about the research topic. During my interaction with government officials, it was evident that their analysis and positions on the research topic were influenced by their need to justify their job and activities and to provide coherent rational perspectives on government initiatives and agenda. Finally, scientists saw me as a colleague with whom they

could be open and reflexive about their ideas and problems in dealing with climate change research. They recognized and discussed some of the criticisms I analyze in this dissertation: research agenda setting and climate change as a “trendy” topic (a new label that more researchers are using to frame their research so they may be able to get research funding), lack of resources to produce climate change data, among others.

I am sympathetic towards fishermen’s demands and claims; however, I am also critical of local dynamics and practices that within the communities are reproducing forms of exclusion and oppression – the same type of exclusions fishers say they are experiencing from “external” actors, e.g. government institutions. I look with particular concern at power dynamics against minorities within these communities – specifically with the “freelance” fishermen, who are the most marginal among the different groups. Similarly, even though I am critical of government officials’ narratives and practices, I am also aware of and recognize the complexity of institutional bureaucratic dynamics that constrain officials’ actions. I also understand government representatives’ role within local communities as a product of complex interactions within a thick network of local actors and institutions.

Performativity however, is only one of many other dimensions at play in interpreting my analysis of fishers, scientists and government officials’ views of my research topic. A comprehensive understanding of subjects’ positions needs to integrate a parallel analysis of their actual practices and actions. In order to understand fishers’ practices, we need to look at the political economy of

environmental changes in the region. The following chapter explains the regional and local contexts, and analyzes some of the key characteristics of the study communities and fishers.

CHAPTER 3. CONTEXT

3.1 Introduction

This chapter is divided into two parts. The first briefly explains the emergence of climate change within the government agenda, and identifies the characteristics of government narratives. I also introduce themes that I explore in depth in other chapters of this dissertation, specifically the process of boundary work in which officials and scientists are engaged. The second part introduces the case study on which this research is based. I discuss the political economy of the study region. I also explore the history of the most important state's interventions, and discuss some of the most important features of these communities, focusing the analysis on fishermen's characteristics and organization.

3.2 Climate Change in the Government Agenda

Climate change first entered into the government agenda in 1992 with Mexico's incorporation into the United Nations Framework Convention on Climate Change that prompted the development of institutional structures and initiatives. However, climate change was not incorporated into the government planning agenda until 2007, in the National Development Plan 2007-2012. Government narratives on climate change adaptation draw on the conceptual frameworks produced by what has been called the international climate change regime, defined as "the explicit and implicit principles, rules, norms and procedures enshrined in the United Nations Framework Convention on Climate Change (UNFCCC), its Kyoto Protocol and related legal documents" (Okereke, Bulkeley,

& Schroeder, 2009, p. 58). These government narratives are based on a grand climate change narrative that, as Bravo explains, “is serving as a point of departure for a plurality of culturally and geographically situated policy responses to climate change” (Bravo, 2009, p. 258).

The government adopts both mitigation and adaptation strategies to mitigate emissions and to reduce impacts, or to use the opportunities that such climatic changes can bring to the country. The narratives explain that mitigation and adaptation are implemented under the principle of “differentiated responsibilities” included in the United Nations Framework Convention on Climate Change (UNFCCC) that recognizes the differentiated role of developed and developing countries in mitigating climate change based on their respective responsibilities and capabilities (CICC, 2012b).¹⁰ It is important to mention that in the UNFCCC, Mexico is a non-Annex I country, which means that it is not required to quantify its greenhouse gas emission limitation or reduction. However, the Mexican government has expressed a voluntary commitment to control emissions; this may be explained as a government strategy to position itself in the international arena as a climate change advocate.

Government narratives highlight two facts that reflect the Mexican government’s commitments to climate change. The first is the enactment of the Climate Change General Law, that “puts the country as one key actor in the

¹⁰ Through this principle the UNFCCC recognizes the differentiated responsibilities between developing and developed countries based on their different contributions to global degradation and change – e.g. per capita greenhouse emissions. The Convention Article 3.1 states that “The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof” (UNFCCC, 1992, p. 4).

world struggle against this threat, guaranteeing the path towards a green growth and a competitive economy that preserve the natural wealth for future generations” (CICC, 2012b, p. 133). Mexico is the first developing country to have a federal climate change law (Ibid). The second is the increase in the federal budget for climate change initiatives that between 2008 and 2011 rose from 14.9 to 564.5 million Mexican pesos (approximately 40.3 million US dollars¹¹) (CEFP, 2011, p. 3). However, this amount was mostly allocated to mitigation programs and projects. As it was explained in interviews, in Mexico there is no formal funding source for adaptation initiatives. The government has been working towards the creation of international mechanisms to allocate funding for adaptation initiatives.¹² Funding has also been channeled from climate change development policy loans received by the government to mainstreaming climate change in government agencies and programs. Since the mid-1990s Mexico has received climate change loans and technical support from the World Bank. In 2011 it received 501 million dollars loan from this institution (World Bank, 2011). In addition, during the period 2006-2011 the World Bank provided training and workshops supporting about 700 state and municipal governments’ officials and NGOs members; and it also organized research groups (World Bank, 2011, p. 16).

There is public funding going to the Natural Disasters Fund associated with climate changes, which has the objectives of repairing the economic impacts

¹¹ Exchange rate January 2011.

¹² In 2012 Mexico received funding for first time from the UNFCCC Adaptation to Climate Change Fund, which was implemented in 2007 with the aim of financing adaptation projects in developing countries.

of these types of events; it is a fund that covers the emergence of public health issues and the impacts of climate change on social services. This fund increased considerably over the last years, from about 7 million Mexican pesos in 2002 to 22 million in 2010 (CEFP, 2011, p. 2). In 2011 a new fund was created, the Reconstruction Fund, to finance repairs of infrastructure impacted by climate change events (CEFP, 2011).

It should also be highlighted that Mexico is the only Non-Annex I country in the world that has elaborated five Country Communications (CICC, 2012a, p. 52). However, according to a government official, mainstreaming climate change within the government ministries and agendas has been a challenge. In an interview, the official explained that “climate change has an important role only in the discourse, but not in practice” since there is a lack of financial resources and people; then, the official added that “it is a contradictory discourse” through which government agencies are asked to integrate climate change using the same assigned budget.¹³

The Intergovernmental Climate Change Commission (ICCC) was established in 2005 to coordinate the decision-making process on climate change issues and the elaboration of the first and second Country Communications to the United Nations. In this period the emphasis was on mitigation policies; adaptation initiatives were incorporated in the agenda later on in 2005 (CICC, 2012a, p. 18). The 2006-2012 period was characterized by a very active involvement on the topic; a variety of instruments emerged during this

¹³ Interview with a government officer from the Ministry of the Environment. July 13, 2012. Mexico City.

stage, such as: the Climate Change National Strategy (2007); the Special Climate Change Program (2009); the Adaptation Policy Framework (2010); the elaboration of the Third, Fourth and Fifth Country Communications to the United Nations; and in 2012, the publication of the Climate Change Federal Law. During this period almost every province in the country began to elaborate Provincial Climate Change Programs and about nine municipalities designed climate change programs (CICC, 2012a, Merino, 2011). Finally, another important effort made by government officials was the organization of the COP16 in 2010, which according to some officials, prompted the positioning of the topic within the government agenda.

Multiple Voices Shaping Narratives

An important feature of government narratives is the multiplicity of voices and actors that take part in their making – mainly national, provincial, and local governments, scientists at national and local universities, international organizations and national and international non-governmental organizations. Therefore, the number of initiatives and the mobilization of resources through different networks requires one to refer not to a singular project and narrative, but to multiple and sometimes contradictory messages and story-lines. Moreover, even though the initiatives analyzed in this research are official documents released by government agencies, the information that is presented comes from different projects and studies conducted by scientists and private advisors in charge of making reports for the government. These documents also integrate

information from different government agencies. This chapter, then, refers to government narratives in the plural to capture the wide range of voices involved in their making.

Information gathered in my interviews revealed the role of international government agencies such as the Global Initiative from Great Britain, which had a key role in promoting the Federal Law in Climate Change – it engaged in lobbying activities for about four years. It was explained that this agency is a cooperative initiative that has the goal to promote the translation of climate change programs into concrete legislation and laws that transcend short-term government administrations in developing countries. Other actors include international and private environmental organizations – such as World Wildlife Fund, Nature Conservancy, Conservation International, the German International Cooperation Agency and the United Nations Development Program, among others – who had made the commitment to collaborate with national government agencies “to develop activities that reduce natural ecosystems and human communities’ vulnerabilities to climate change impacts” (CICC, 2012a, p. 107). Development agencies from countries such as Korea, Spain, Japan and France are also collaborating on climate change initiatives in Mexico.

Of particular relevance is the role of international organizations such as the World Bank, who is establishing the funding and conceptual frameworks in climate change adaptation initiatives in Mexico. As I explained in the previous chapter, in my study region the World Bank is implementing the project “Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of

Mexico.” The Inter-American Development Bank and the Latin American Economic Commission have lent resources and provided technical assistance to Mexico on climate change initiatives as well (CICC, 2012b, p. 137). Other international initiatives such as the Local Environmental Initiatives – in collaboration with the British government – are funding the creation of climate change programs in some Mexican municipalities (CICC, 2012a, p. 95). These initiatives exemplify specific forms of “hybrid governing arrangements” (Bulkeley, 2005) which are analyzed in the governance literature by questioning “how climate change is governed” (Okereke et al., 2009), highlighting the role of non-state actors in the making of environmental regimes worldwide as well as illustrating “the ways in which new geographies of environmental governance are taking shape” (Bulkeley, 2005, p. 897).

At a national level, my research findings agree with other studies that explain that in Mexico the role of a group of scientists from the national university – Universidad Nacional Autónoma de México (UNAM) – and government officials from the Ministry of Environment have been key in the process of mainstreaming climate change within the Mexican government agenda (Pulver, 2007). It is clear that it is a small group of meteorologists, biologists and ocean scientists from the UNAM and from some local universities who have had an active role. In an interview, the director of the UNAM Climate Change Research Program explained that he has been interested in promoting social science research; however, he argues that their participation in this field is still marginal. This is an

important observation that highlights who and what type of knowledge is being used by government institutions to understand and frame climate change.

Coproduction and the Role of Governments

In Mexico, governments position themselves as key actors in the making of climate change initiatives through the following practices: a) as the ultimate authority in approving climate change programs to be implemented at the local level; b) by choosing the actors who are to be involved in formal decision-making processes, which determines the configuration of the political setting in which policy-making processes take place; c) by deconstructing scientific data produced by national scientists and by the IPCC in the process of producing public information; and d) as key “translating” agents of scientific knowledge to citizens, to people that “do not necessarily understand this type of information.”¹⁴ Government narratives also explain that agencies are important actors in “socializing” the topic of climate change within different government agencies and among key sectors – private, NGOs, and scientists.

Based on the IPCC methodology, scientists and universities are in charge of elaborating Climate Change Provincial Programs whose guidelines were designed by a “hybrid science-policy community” (Shakley & Wynne, 1996, p. 276). But it is a national government agency who provides technical advice and the formal official approval of these Plans. It is important to mention that the role of the government goes beyond the formal approval of these initiatives since it also affects and determines the kind of actors to be involved in decision-making

¹⁴ Interview with a government official from the Ministry of the Environment, Provincial Government. May 28, 2012. Tabasco.

processes. Government officials write down the list of participants of private and social sectors to be convened as members of the committees that validate such initiatives. In an interview, an official explained that when thinking of that list of names they were very cautious about including certain types of non-governmental organizations that clearly had a more “political” vein.¹⁵ In this particular case the organization being referred is an active NGO with a history of challenging government policies; their members have helped communities in their struggles against the oil industry for decades. In the government officer’s view, because this local NGO had a particular political agenda and claims against the government, then its participation may impact on the production of science-based policy climate change initiatives that should be neutral, science-based and depoliticized. Implicit in the government official’s comments was the idea that climate change – and the actors in charge of dealing with it – should be “depoliticized” so the classic model of separation between science and politics and policy-making can be shielded.

Research findings illustrate the power of state agencies in determining a research agenda. But this process also involves an accommodation and negotiation of scientists’ own interests. While conducting fieldwork in Tabasco, national government agencies organized a meeting with scientists to plan the creation of the National Climate Change Research Institute. During the meeting, discussion focused on how scientists can think of their own research agendas in light of the climate change problem. They were asked to reframe their own

¹⁵ Interview with a government official from the Ministry of the Environment, Provincial Government. May 28, 2012. Tabasco.

approaches and practices to address simultaneously climate change issues. For example, some panelists explained that the use of a multidisciplinary approach to understand climate change require scientists to engage in more collaborative work.

Furthermore, attempts to position climate change as a legitimate topic for a research agenda have also been questioned among the community of scientists. In comments overheard after the above-mentioned meeting, scientists overtly stated that from now on they would re-label their original research under the name of climate change so they can get funding and have the opportunity to be part of this center. One of the comments was particularly interesting: a biologist recognized that in his study he had not found any evidence of climate change; notwithstanding this recognition, he kept saying he would reframe his research. In one of my interviews a local scientist explained that in one meeting, while a government official explained the relevance of climate change, a member of the meteorology office commented to him that this was not true, that in their records there was no evidence of climate change. It was clear from the two examples that these perceptions among the scientific community are not interfering with funding planning and the creation of climate change initiatives or in their own decisions to participate in them.

This case illustrates S&TS scholars' discussion about the idea that "research knowledge is a product of politics" (Cozzens & Woodhouse, 2001, p. 534) since it is the product of the power exercised by funders – in this case government and international agencies – which are determining who participates

in climate change research, and “in what network of power relationships” actors would be immersed and carry out many other political negotiations (Ibid). From this perspective “science and scientists are not politically neutral, rather politics structures the provision of advice in multiple ways, including structuring research programmes” (Carter, 2013, p. 27).

However, it is important to highlight the contentious challenges and negotiations that are taking place in the process of positioning climate change. Interview findings show the tensions in the science-policy interface and how scientists challenge state power. Scientists that have actively collaborated with government agencies in the making of climate change initiatives did not fully identify with certain government practices. Scientists’ work is used in the making of some initiatives but this is not to say they agree with the final product. In fact, as some documents and the interviews clearly show, scientists do not see themselves as part of the making of such policies and initiatives, since they do not have the final word on the narratives presented in the name of government agencies.

Boundary Work

In following IPCC guidelines in the making of climate change provincial plans, Mexican governments – national and provincial – are actually creating the setting for the emergence of boundary work by selecting groups of scientists from specific bodies of knowledge, disciplines and professional institutions as participants in these initiatives. In the guidelines to design these programs the

government explains that it is the scientists and universities who should coordinate the technical studies, since this sector has special characteristics: (a) it is a more stable sector since government officials and projects may change every government term, the university appears to be a place that can guarantee continuity in climate change programs and plans in the long-term; (b) it has solid basis to understand the phenomenon and; (c) it is highly credible and trustworthy (Tejeda & Conde, 2009, p. 69).

As I discuss in this dissertation, government narratives use science as a legitimate source to position climate change as a public issue. Scientists have been characterized as “neutral” actors that hold more credibility and legitimacy before Mexican society than the government. In interviews and in some documents scientists also endorse this representation. Leon et al. (2012) explain that the promotion of adaptation initiatives should be based on a scientific discourse because it provides codified messages that allow dialogue among different sectors and actors. This scientific discourse, the authors explain, would also help to avoid an interaction based on political discourses or discourses that are based on “trendy topics” (León, Magaña, & Guigue, 2012, p. 62). In looking to construct alliances and agreements, the authors argue, government promoters should look for “neutral” interlocutors such as scientists and members of non-governmental organizations (León, Magaña, & Guigue, 2012, p. 62). I will take up these ideas in the following chapters where I discuss climate change government narratives in detail.

Neoliberal Environmental Policies in Mexico

Climate change government narratives in Mexico have emerged in a context of what many scholars (Sunkel & Zuleta, 1990; Valenzuela, 1991) have labelled “neoliberal” government policies.¹⁶ In my research, climate change initiatives are analyzed as part of broader structural political and economic transformations in the country. Important policies and initiatives include, for example, the agrarian reform to Article 27 of the Mexican constitution and changes in federal agrarian and forestry and water-use laws. These have changed, impacted and reframed property rights and natural resource access, use and management in local communities, including those in the study site.¹⁷ The agrarian reform has been particularly important: it aimed at transforming *ejido* lands to more productive units since according to the government, productivity was the key towards the improvement of peasants’ quality of life. However, debates over the radical transformation of relations of production, on the de-ruralization of the rural areas, on the relationships of the peasants with their lands and local agrarian organizations, are among the many issues raised by peasant organizations, activists and scholars. More recently, key debates around the privatization of the oil industry constitutes another important case where issues about sovereignty and the role of transnational corporations in the profiting of natural resources are at stake.

¹⁶ Neoliberal policies promote outward-oriented economies, privatization, liberalization and state deregulation. Among some key characteristics are an understanding of open, competitive and unregulated markets as the optimal mechanisms to organize economies (Brenner & Theodore, 2002).

¹⁷ Historically the *ejido* land was inalienable, not subject to sale or transfer. The Reform included amendments to provide private property to *ejidos* and common land, so that their owners could sign any kind of contract. With the Reform, owners could sell, rent, mortgage, and cede their rights of property as member of the *ejido* (Vargas, 2005, p. 103).

Environmental strategies that have been defined as neoliberal include initiatives such the Payments for Ecosystems Services (PES) programs - promoted by the Global Environmental Fund through the World Bank.¹⁸ Some of the neoliberal features integrated into this type of intervention are market-based resource management approaches that reframe how natural resources should be managed and valued; an emphasis on efficiency as key criteria for resource protection, conservation and use; the key role of social participation as a procedural mechanism to integrate stakeholders; and finally, the emphasis on encompassing both resource conservation and management aimed at directly or indirectly reducing poverty. The payments for environmental services programs, for example, were conceived as “a triple-win solution for nature, private investors, and the poor” (McAfee and Shapiro, 2010, p. 580).

Mexico has one of the most extensive PES program in the world (McAfee & Shapiro, 2008), and in Tabasco a government representative explained in an

¹⁸ Another type of environmental policy characterized as neoliberal has been sustainable development. In Mexico, the National Program on the Environment 1995-2000 integrated this perspective as one of its key axes. In general terms this approach referred to the reconciliation and intersection between environmental protection, economic growth and the satisfaction of people's needs. Sustainable development has been broadly analyzed; some discussions regard this policy as a neoliberal strategy to address environmental issues that does not question dominant models of economic growth (capitalism) that generate poverty, inequality and the overexploitation of natural resources (e.g. Escobar, 1995). Instead, and in a context of environmental degradation and resource overexploitation, these types of initiatives are explained as strategies to reconstruct capitalism (Dickens, 2002; Escobar, 1995). However, in Mexico sustainable development was explained by government officials as a fundamental policy to address both natural resource restoration, conservation and management on one hand, and poverty reduction on the other. Julia Carabias, a biologist from the National University of Mexico, strongly promoted this project as part of the government agenda when she was the minister of the Ministry of the Environment (1995-2000). Under this sustainable development strategy, natural protected areas should be transformed as regional sustainable development enclaves, by promoting the active participation of indigenous and non-indigenous community members, who were the inhabitants, owners and managers of this territory and its resources.

interview that they were preparing a PES proposal.¹⁹ PES are defined as mechanisms that “translate external, non-market values of the environment into real financial incentives for local actors to provide environmental services” (Engel, Pagiola, & Wunder, 2008). PES are characterized as neoliberal, in that they are “based on the premise that the natural environment can best be safeguarded by valuing and managing “nature’s services” as tradable commodities” (McAfee & Shapiro, 2008, p. 580). However, the challenges and struggles to implement PES programs in Mexico illustrate the contentious character of neoliberal perspectives on how “nature” should be conceived, used and managed, for whom and for whose benefits.

In recent years the emergence of literature about the “privatization” or “neoliberalization” of nature shows how capitalism is restructuring its modus operandi in a new context of environmental politics (Castree & Braun, 1998; Escobar, 1996).²⁰ Castree and Braun (1998) point out the different modalities of nature’s neoliberalisation that have been pursued in relation to a range of biophysical resources. They argue that nature everywhere is “enterprised up” and that global nature is remade in the image of the commodity (Castree & Braun 1998, p. 4). Dickens explores an interesting idea regarding the role of capitalism in reconstructing itself. He argues that in that process capital is also redefining

¹⁹ Interview with a government official from the Ministry of the Environment (provincial government). May 28, 2012. Tabasco.

²⁰ Peck and Tickell (2002) use the term neoliberal(ization) to place more emphasis on the concept as a process than as an “end-state”; it also refers to the different types of neoliberal policies which are unevenly implemented around the world as well as the variations and mechanisms that mediate them on the ground (p. 383).

what constitutes “nature” and “society” and their relationship, positing them as being always “renegotiable” (Dickens, 2002, p. 55).

As I state above, my analysis of climate change narratives in Mexico should be understood in light of the political and economic neoliberal shifts Mexico has experienced since the 1980s, and in particular the promotion of environmental initiatives since the 1990s. In this dissertation I argue that to understand government initiatives and actors’ views on environmental changes, we need to take into account the contexts in which they emerge. However, I also argue against determinist views that explain social processes as a direct result of neoliberal policies. I argue that neoliberal initiatives such as the ones described above interplay with a historical and multilayered set of other factors. As Brenner and Theodore (2002) explain,

we emphasize the contextual embeddedness of neoliberal restructuring projects insofar as they have been produced within national, regional, and local contexts defined by the legacies of inherited institutional frameworks, policy regimes, regulatory practices, and political struggles (p. 349).

There is also another important reason why explaining neoliberalism as a direct causal factor does not help to answer my research questions. In this dissertation I avoid the use of the term neoliberalism, and it is not a core concept in my research because in my analysis of climate change adaptation narratives I actually did not identify many features attributed to that type of policy. Instead, I frame my analysis of these narratives as arguing for the emergence of a new kind of development discourse, since these narratives allude more to teleological

ideas and ideals about how to achieve a better future, rather than to concrete market-based mechanisms. This however is not the case for climate change mitigation initiatives that are more clearly based on neoliberal-related ideas – e.g. REDD+.

As I discuss in this dissertation, only some characteristics of government climate change narratives reflect neoliberal strategies and concepts of natural resource use, access and management. In chapter 5, I discuss in detail how government narratives refer to a subject-making process which directly or indirectly refers to how fishers need to face their own risks, the transfer of state responsibilities to the citizens, the role of social participation as a recipe to project implementation success, among other features.

Promoting Climate Change in the Government Agenda

Government climate change adaptation narratives are based on grand narratives that emerge in international organizations and national epistemic communities that have designed and financed projects and initiatives. Of particular relevance is the role of the World Bank, which is promoting and coordinating some of the initiatives analyzed in this dissertation. Government narratives base their analysis on and adopt the language of mainstream ideas that circulate within North American academic spheres as well. The question of how and to what extent government narratives are being shaped by international institutions such as the World Bank requires an analysis that goes beyond the scope of this dissertation. However, my argument is that global frameworks are not imposed in a “top-

down” fashion, but they are negotiated on the ground, with different stakeholders and actors such as government agencies, non-profit activists, peasant and fisher local organizations and social movements, whose practices transform and shape these global initiatives.

As I discussed above, the role of government agencies and national epistemic communities have been key in positioning climate change within the government agenda. Edwards argues that the emergence of an epistemic community with “compelling interest in global change issues... is one of the major reason why global change has reached the political agenda of governments” (Edwards, 1996, p. 150). But the question of why certain themes and topics such as climate change adaptation are being promoted by certain groups within and outside the government sphere may be explained by many other factors.²¹ The first has to do with personal agendas politicians want to promote. This is the case of the promotion of climate change by the Mexico City government. According to a government official,²² the head of government of the Federal District (Mexico City), Marcelo Ebrard, has worked and promoted climate change research since years before he took this office, when he was scholar and researcher in a research center. When he was the city Major, he saw the

²¹ Pralle analyzes agenda-setting processes and climate change, suggesting a list of “political strategies for raising the salience” of the climate change problem. Among various measures, she proposes to emphasize scientific consensus and knowledge, public concern and local impacts (Pralle, 2009, p. 797). Buttel, Hawkins, & Power (1990) discuss the factors accounting for the prominence of global change “as a dominant issue” in government, international organizations, environmental movements and research agendas (p. 58).

²² Interview with a government official, Ministry of the Environment, Provincial Government. July 14, 2012. Mexico City.

opportunity to promote climate change by producing the first Climate Change Plan of the county, and to project his own image internationally as well.²³

A second possible explanation of the promotion of climate change initiatives may be the possibility of receiving international funding to promote national adaptation projects. However, at this stage Mexico's government is borrowing funds to promote its initiatives. It is in 2012 when Mexico for first time received funds from the Global Environmental Fund to be channeled to adaptation initiatives. The lack of funding for adaptation initiatives is a very contentious issue in Climate Change conventions and international meetings.

The promotion of climate change may reflect the interests and needs of certain government officials and groups in their search to promote their work and expertise, and to get economic resources for their agencies. In fact, the question of what criteria are used to distribute climate change financial resources within government agencies is important to answer. In chapter 6, I discuss the role of the Ministry of the Environment vis a vis other agencies such as the Ministries of Health, Agriculture and Energy in establishing their own climate change agenda. I explain that the Ministry of the Environment has no political and financial power, its budget is small compared with the other ministries, and this reduces the scope of their influence in setting the agenda, or even in promoting particular frameworks in dealing with climate change adaptation.

In sum, the translation and integration of global initiatives into national agendas is contingent on several factors. For example, in the case of developed

²³ In 2010 Marcelo Ebrard was nominated as the "world's best mayor" by the Project World Mayor.

countries, political and interest groups may mobilize strategies to prevent mitigation measures that may represent an obstacle to “do business as usual,” preventing the expenditure of public funding to climate change programs as well. In the case of developing countries, the promotion of these type of climate change initiatives may represent the acquisition of aid funding from international organizations. In the case of Mexico, however, adaptation initiatives in the Gulf of Mexico have been designed through government debt.

3.3 Case Study: Coastal Communities in Tabasco, Mexico

This section, consisting of two parts, introduces the case study of my dissertation. At a macro level, it describes some of the most important state interventions that were implemented in Tabasco during the twentieth century. This analysis is aimed at contextualizing the emergence of climate change interventions in this region in light of past initiatives that have had long-term negative impacts on people’s livelihoods and their environment. At a micro level, the second part of this section analyzes some of the features of my study communities, with a particular emphasis on fishermen’s lives and organizations. As I discuss throughout the development of this dissertation, in order to understand fishermen’s views and perceptions of local environmental changes, it is important to analyze the history of this sites as well as the political and economic context in which these environmental changes are taking place.

3.3.1 State Interventions: The Historic Construction of Vulnerability in Tabasco

Throughout its history, Tabasco has been a territory that bears contradictory meanings for state actors, fishers, peasants and scientists. It is a region described as backward and isolated, a frontier, a place where modernity – economic production, roads, infrastructure, progressive ideals and ideas – has struggled to settle, and as a waste of unproductive land. This picture takes another form when one follows the history of the state’s interventions, which have conveyed messages such as the existence of an ideal territory waiting for the workings of human hands to thrive: extensive territory to be productively used at the service of national interests. A blank page to be filled with unimaginable potential interventions.

Historically Tabasco has been a locus of governments’ development “experiments” that have resulted in what Tudela (1989) describes as a “harmful development”. There have been three key historical moments in the state’s efforts to advance this land’s productive potential: from (i) its promotion as a banana enclave, to (ii) the “conquest” of swamplands through a massive deforestation of lands to be incorporated into agricultural and livestock farming and, more recently, (iii) its positioning as one of the most important oil producing regions in the country, in the context of the oil boom. These projects have taken more or less similar form as an enclave, extraction-based and crop-boom economy. These have been state-led undertakings, based on intensive resource exploitation, designed to fulfil external – national and international – markets, and that have reconfigured the social space by introducing new organizational forms

of production and modes of extraction (Bunker, 1985), changes in property land rights, migration – and in the ecological space, changes in land-use, water and land pollution, among others.

To some extent, Tabasco's state interventions could be also described as the archetype of failed "high modernist" projects, of well-intended utopian social engineering schemes to improve the human condition (Scott, 1998). Scott explains that these projects are based on a "supreme self-confidence about continued linear progress, the development of scientific and technical knowledge, the expansion of production, the rational design of social order, the growing satisfaction of human needs, and, not least, an increasing control over nature" (Scott, 1998, p. 89). Government discourses in Tabasco were permeated by ideals about the need to become modern, to promote technical knowledge to domesticate and use "unproductive" swamp lands, to promote the potential productive capacity of that territory.

These interventions had many goals. Through these projects the government aimed "to remedy the social ills – poverty, sickness, and illiteracy – which had resulted from Porfirian [dictatorial] rule" (Ridgeway, 2001, p. 138). The state's hand expanded into these territories to promote the creation of new settlements that would alleviate the problem of lack of land among landless populations in other areas of the country. This "march towards the sea" also had the objective of promoting the extraction of raw materials for exportation with the aim to attract investments and increase commercial profits to be invested in the industrial modernization of Mexico (Arrieta, 1994, p. 11). The "myth of the

productivity” of the coastal lands, then, was the driving force behind the promotion of these projects (Martínez, 1979, p. 88).

These economic projects emerged in a particular post-revolutionary historical context of a strong authoritarian state, the consolidation of a federal system and the positioning of the official political party that ruled the country for more than seventy years. The characteristic arbitrary exercise of governmental authority was accompanied by effective control by the executive branch of the other political authorities, like the legislative and judicial powers; and by strict government controls on opposition political parties and the electoral process (Fox & Hernández, 1992). As it was the case of other countries in Latin America, political and social life in Mexico “has long been shaped by the heavy hand of the state” (Fox & Hernández, 1992, p. 167); therefore, the interventions I analyze here must be understood in light of this political backdrop.

In the nineteenth century the main economic activities in Tabasco were the production of tobacco, timber, cacao, coffee, pepper, indigo, sugar cane and vanilla (Martinez, 1979). From colonial times to the middle of the twentieth century, the uncontrolled extraction of mahogany and other tropical woods was one of the most important economic activities in Tabasco (Arrieta, 1994). The exportation of tropical woods was one of the most profitable activities: from 1857 to 1872 felling increased from 273 to 16,000 tons, and the exportation of rubber trees increased from 459 kg in 1888 to about 416 thousand in 1910 (Martínez 1979).²⁴

²⁴ Felling was one of the most profitable activities since it was possible to elude taxes and cut more trees than were authorized (Martínez, 1979).

At the beginning of the twentieth century, banana plantations emerged as one of the most important export products.²⁵ In the 1920s, Tabasco was one of the largest banana-producing provinces in the country, forming part of the banana boom in Mexico – “the new green gold” (De Giuseppe, 2011). Production and marketing were organized through a cooperative system organized and controlled by the state. This strategy was designed and promoted by one of the most popular cacique leaders in Tabasco, Tomas Garrido,²⁶ “the strong man” (De Giuseppe, 2011, p. 646). Through this system the government established a clientelist relationship with workers and gained political control over their union (Rideway, 2001, p. 165). Corruption, nepotism and repression constituted the backdrop in which the plantation-based economy and other economic activities developed (Rideway, 2001, p. 165). The banana boom ended due to increasing pests in the 1940s; production diminished from 180 thousand tons in 1935 – representing 40% of the national production – to 1, 500 tons in 1941 (Martínez, 1979).

The decline of the banana boom was followed by another structural transformation of the natural landscape promoted by the state: the allocation of

²⁵ In 1906 the Southern Steam Ship and Importing Co. made the first banana shipment to the United States, a shipment that was subsidized by local entrepreneurs and public funds (Martínez, 1979). At the time, Tabasco was also exporting other fruits such as oranges, lemons, pineapples and eggplants.

²⁶ Tomas Garrido was one of the most controversial political leaders of the post-revolutionary era; he held power for 15 years. The main political messages of his agenda were to promote “the modernization” of Tabasco through the organization of its society based on a set of strong moral and ethical values, such as a radical anti-clerical position, the promotion of an anti-alcoholic campaign, as well as the organization of teachers and women (Martínez, 1979). His government was characterized as socialist; the modernization project included the creation of worker cooperatives and a strong corporative social organization: “in each village, town, municipality and city the workers from any trade were organized into the Central Resistance League” (Martínez, 1979, p. 58). Young political groups were also organized into the Red Shirts, “an organization that served as a promoter of Garrido’s ideology” (Martínez, 1979, p. 39).

lands and the organization of *ejidos* in forest lands, as part of a late implementation of a late agrarian reform in 1940s (Tudela, 1989, p. 82). This territory was distributed among landless peasants from other provinces, mainly from the neighboring province of Veracruz. In the process, thousands of forest lands were cleared; “in the regional and national consciousness the forest was conceived as an obstacle whose removal was necessary to allow the emergence of an agriculture development process” (Tudela, 1989, p. 82). This process of deforestation was followed by another, more “powerful and systematic,” promoted by the cattle breeding sector – the transformation of forest lands into pasture lands (Tudela 1989, 86). The emergence of livestock farming then, with its “easy profit” strategies, accelerated the deterioration of Tabasco soils (Lezama, 1987).

In the 1960s Tabasco was the locus of what has been characterized as one of the most important transformations of the region, the Chontalpa Plan, which changed wetland ecosystems into lands for agriculture and cattle production. This project was part of the large-scale land development projects the government had promoted with the aim of broadening the agricultural base beyond the central territory; it was also part of government experiments to develop the tropical-wet coastlands that started in 1940s, in the neighboring province of Veracruz, which represented “the first concerned look southward by Mexico” to a historically “neglected” region (Dozier, 1970, p. 62).²⁷

²⁷ Arrieta (2006) explains that the government strategy to modernize the tropics was inspired and based on the model applied in the Tennessee Valley in the United States; however, unlike the Tennessee model that aimed to recover underdeveloped economic regions, in the Mexican case

The Plan was a pilot project to test technologies designed to exploit the tropics; it also intended to take advantage of collective forms of production such as the *ejido* system (Velázquez, 1982, p. 90). The Plan entailed building dams, draining channels and wetlands, constructing infrastructure to provide fresh water, sewer systems and roads; it also included campaigns to combat pests (Pinkus & Contreras, 2012, p. 124). The purpose of this program was to incorporate 352 thousand hectares into production with crops such as sugar cane, bananas, rice, cacao and citrus fruits, as well as cattle (Pinkus & Contreras, 2012; Dewey, 1981). This land was divided in *ejidos* and distributed to 500 families (Pinkus & Contreras, 2012).

However, the success of this type of entrepreneurship was strongly determined by the characteristics of the natural ecosystems. Nature was an active agent shaping some of the project's results:

Such agricultural endeavors struggled against great odds. All have been subject to periodic dislocations, decline, revival, and at times complete abandonment – due to floods. The entire area is a maze of abandoned distributaries, extensive swamps, and lagoons, the patterns of which have shifted greatly during post-Columbian times and indeed within just the past century. Agriculture has been precarious even on the normally better-drained natural levees (which have always been the attractive sites), while some formerly cultivated lower parts have been flooded more or less permanently, with no outlet for the water except by slow evaporation (Ridgeway, 2001, p. 63).

the objective was “to transform the backdrop of poverty in large frontier regions for the expansion of the national productive system” (p. 1).

“Taming” waters was one of the many actions planners envisioned for the viability of the Plan (Ridgeway, 2001, p. 72). As Arrieta (1994) explains, “the legendary promise of the wealth of the tropics” (p.7) was contingent on the control of water through an extensive network of infrastructure – including the building of one of the largest dams in Latin America (Ridgeway, 2001; Dewey, 1981).

Arrieta (2006) explains that with the loans obtained from the Inter-American Development Bank, government expectations of the Plan were high: i) during the following 14 years about 3, 300 families would get an income 20 times higher than before; ii) technicians would implement an experimental project to drain 50,000 hectares; iii) the government proposed the building of infrastructure, the organization of peasants, the transfer of direct loans and the implementation of training programs for peasants; iv) every family was provided with 15 hectares of land, in which the cultivation of crops such as corn, cacao and banana was promoted; v) the Inter-American Development Bank and other two consultant companies considered necessary to also include social services such as urbanization, services, schools, health centers, etc. (p. 1-2).

Analysis of the many impacts of these types of extractive and crop-based large-scale projects in Tabasco echoes discussions of these types of economies around the world (Hall, 2011; Bunker, 1985). In the province, scholars have analyzed local changes such as the disintegration of local social structures and organizations, and their substitution by productive organizations such as *ejidos*. Among these impacts are the reproduction of clientelist engagement and

relationships with the government, and corporatist peasant organizations – largely based on corrupt and clientelistic practices – affiliated to the official political party, which assured the political control of peasants by regulating access to land.

Among other transformations were the proletarianization of formerly self-sufficient *campesinos* and long-term environmental impacts (Martínez, 1979; Pinkus & Contreras, 2012). They explain that one of the most radical changes peasants experienced was the substitution of their traditional structures – family and collective work – for *ejidos* and salary-based work. Martínez (1979) explains that the main paradox of this Plan was that the strategy of creating *ejidos* to organize production put an end to collective work. Historically, the harsh natural conditions of this type of ecosystem required collective work strategies to be able to produce. Up to that time, collective units managed plantation and cattle production; people who owned a fraction of these lands were shareholders that shared the final product.

The Plan aimed at transforming this region into “Mexico’s breadbasket”; however, land productivity did not increase as expected (Martínez, 1979; Pinkus & Contreras, 2012). In the 1960s rice production reached a total of thirty thousand tons, but by 2008 decreased to nine thousand tons (López, 2008). As some analysts explain, these types of initiatives show – as is the case of other experiences around the world – that the Chontalpa Plan was more the product of a political decision made by native leaders with strong political networks and

support in national spheres, rather than one based on technical or social grounds.

To explain the “failure” of the Plan, the political elite re-cycled past colonial social representations: Tabasco’s population and immigrants from the country were “starved people, chronically sick persons, without any organization and condemned to live a precarious life because of the weather, the flood and the promiscuity” (Arrieta, 2006). For local peasants however, the Plan failed for three main reasons: the lack of government support, the environmental impacts of oil that affected their lands’ productivity, and mismanagement by government officials and local *ejido* leaders (López, 2008). The Plan started to decline in the 1980s – the “lost decade” for Latin America – when Mexico’s oil crisis and the implementation of structural neoliberal reforms affected public investments. After experiencing the “technical and social” failure of the Plan (Chávez, 2010) the government closed production projects – the center for milk production, the rice mill, the machinery maintenance center, the pig livestock, and the banana and cacao plantations. Government-funded social and production services, such as passenger transportation, veterinary medicine and fertilizers, came to an end (López, 2008; Chávez, 2010). On top of these problems, the *ejidatarios* were left with debts.

Among the many benefits of the Plan was an improvement in living conditions – people had more access to health and education – and the improvement of other social services such as road infrastructure (Martínez, 1979; Pinkus & Contreras, 2012). Pinkus and Contreras (2012) mention as some of the

positive outcomes the creation of new villages and the redistribution of the population. However, this has been one of the most contentious issues of the Plan. The government's expropriation affected 6,830 peasants; these lands were used to relocate 4,634 families into 22 urbanized villages (Chávez, 2010). Uribe (2010) describes this process as a radical uprooting that local peasants experienced in two ways: through their relocation or expulsion from their lands, and also through the transformation of their natural environment that underwent important changes due to deforestation, oil pollution, etc. (Uribe, 2010, p. 4). Along with the problem of the abundance of water, another key obstacle and "probably the most important, was that the peasants did not like the rapid restructuration of the lands, they did not agree to be relocated into the new 22 *ejidos*" (Martínez, 1979, p. 49). Canudas explains that the Plan was an example of "acculturation" as it had occurred during colonial times: "in a few months, the population of a region changed their status, their location, home and their environmental surroundings. They needed to change their productive strategies as well" (quoted in Martínez, 1979, p.51). As Chávez, Galmiche, Rist, & Bern (2009) explain, the managerial modernist vision of the Plan promoters had a unidimensional and reduced concept of territory,

ordering the population in relation to an ideal of economic rationality and efficiency... in which the communities, the vegetation, the water and the land were considered as simply homogeneous and replaceable building blocks, without any consideration of peoples' heritage and way of living (p. 4040).

Local peasants protested against this Plan because they were not taken into account in the process; however, the state used military force to suppress any social discontent (Murillo, 2004). One more time, as in other interventions, Tabasco was used to accommodate an ideal national interest rather than address the needs of local inhabitants; under this scheme, “the local population was not the subject of development but its object” (quoted in Murillo, 2004, p. 645).

The most recent structural transformation experienced in Tabasco has been the emergence of the oil industry, initiated during the 1950s but expanded during the 1970s after the discovery of important oil and gas fields. During Mexico’s oil boom – 1976 to 1982 – the country increased its oil reserves from 5.5 billion barrels in 1970, to 16 billion in 1977, and 60 billion in 1980 (Gavin, 1996, p. 10). In 1980 Tabasco – the “Emerald of the Southeast” – produced more than half of Mexico’s total oil exports (Lezama, 1987, p. 235). In 2009, Tabasco was the second most important oil and gas producer in Mexico, just after the production that took place in territorial waters; it contributed 28% of the total oil production and 30% of gas production in Mexico (INEGI, 2009); in 2013 it was the most important oil and gas producer (SENER, 2013). Scholars report that the expansion of the industry increased giddily: in 1976 the government invested a total of 421 million pesos, and two years later, the amount was about 10 thousand million (Velázquez, 1982, p. 169).

The Mexican government had high expectations: the oil boom represented the possibility of restructuring the “import substitution” economic model; it was an

opportunity to increase its foreign currency reserves, to improve public finances, to promote industrialization and economic growth. In short, it represented the possibility “to overcome the problems associated with Mexico’s underdevelopment condition” (Negrete, 1984, p. 96). The oil facilitated Mexico’s consolidation as an emergent economy in the international sphere (Delgado, Jiménez, Espejel, Ferman, Martínez, Mejía, & Seingier, 2011). This period represented, then, the adoption of a mono-exportation model centered primarily on hydrocarbon resources.

The oil sector’s contribution to the provincial economy was about 50% in 1970, and 70% in 1978. Table 2 shows the economic share of this activity in the province more recently.

Table 2. Tabasco Gross Domestic Product, 2009.

Economic Sector	Participation in Tabasco Gross Domestic Product
Primary Sector:	1.36
- Agriculture, livestock, forest production, fishing and hunting	1.36
Secondary Sector:	70.27
- Mining (oil and gas production)	60.64
- Construction, electricity, water, gas.	6.46
- Manufacturing	3.17
Tertiary Sector:	28.37
- Commercial	8.56
- Transportation and Information	3.7
- Financial and Real Estate Services	6.16
- Education and Health Services	4.99
- Government Activities	2.72
- Other Services	2.19

Source: INEGI, 2009.

This industry had a radical impact on the style and quality of life of local peasants, on their environment, on their economy and fundamentally, on their social relations. In discussing the characteristics of extraction economies, scholars highlight “demographic and infrastructural dislocations” as one of its important impacts (Bunker, 1985, p. 23). The location of the sites where raw material exploitation takes place are commonly far from the existing urban, social and economic centers, which increases the costs of infrastructure – social services, transportation – as well as the costs of foodstuff to supply the emergent demand. In Tabasco scholars have analyzed the same type of problems.

The oil boom accelerated the increasing national and inter-provincial migration flows that have been taking place in Tabasco since the middle of the twentieth century, with the agrarian reform. However, an important characteristic of these migrations promoted by the emergence of the oil industry is that they were mainly intra-municipal flows (Lezama, 1987).²⁸ During the period 1940-1980 the population in Tabasco grew four times, rising from 285 thousand to more than 1 million people; the province’s growth rates were higher than the national average (Negrete, 1984, p. 90). There is contradictory information about the role of the oil industry in creating jobs. Negrete (1984) for example, argues that until the 1970s migrants flocked to work in the agricultural sector; however, after that

²⁸ A municipality is the smallest political and administrative subdivision of the Mexican federal system, with power of self-government and jurisdiction. Tabasco has 17 municipalities within its territory. Lezama (1989) explains that in the 1970s in oil municipalities, there was a higher participation of women in migration flows than men. The character of migration to oil municipalities is familiar: men moved to the oil sites with their children and wives. This could lead to the hypothesis, Lezama (1989) adds, that the oil industry could have created indirect jobs for women, in traditional activities such as domestic work, as peddlers, or in administrative-related jobs. Non-oil municipalities show an opposite trend; in this type of migration, men are the main migration group.

decade the flows increased to municipalities where Pemex had productive and extractive activities (Ibid). However this is not to say that the oil industry employed this migrant labor. Lezama (1987) questions the role of the oil industry as the main sector generating jobs; in fact, what happened in the case of Tabasco is that the oil industry promoted the diversification of other sectors, such as construction and manufacturing, which generated more employment. The oil industry worked as a catalyst in the promotion of other economic sectors. The role of the oil industry in the labor market is also questioned by the fact that in four of the seven oil municipalities in the province, the agricultural sector employed more labor during the oil boom (1970s) than in decades before (Lezama, 1989). This discussion demonstrates the role of the oil in Tabasco, an enclave industry that disrupted local and regional social and economic processes, oriented to external markets, and with poor results in terms of activating the local economy by generating employment.

Increasing migration gave rise to different social disruptions. Municipal authorities lacked the capacity to plan and provide services that the growing population demanded. Increasing population growth gave rise to the creation of irregular settlements where no service was provided, an increase in the price of housing, and pressure over the provision of basic social services (Velázquez, 1982).

Allub (1985, p. 351) explains that migrants from around the country were incorporated into a “traditional” social stratification²⁹ comprised by *ejidatarios*,

²⁹ It is interesting to notice how scholars use the term “traditional,” which appears to refer to any structure or arrangement found in place before the emergence of a new event. For example, in

small rural producers and local traders. These migrants were mainly workers, employees and technicians whose salaries were higher than those earned by locals. This new social stratification had an impact in terms of labor markets, income distribution and consumption patterns: distortion of the local economy was expressed in the decrease of local investments and the increasing demand for goods and services produced outside the province (Negrete, 1984, p. 103).

As a consequence of oil extraction, public revenues in Tabasco increased from 1.5 million pesos in 1973 to 650 million in 1977 (Negrete, 1984). Paradoxically, these economic resources were not translated into better local conditions for the Tabasco population: between 1971 and 1976 the province invested 72% of its resources in oil-related infrastructure and only 28% was distributed to support other economic sectors (Lezama, 1987, p. 236). The oil boom, then, reinforced Tabasco's role as an "enclave" economy – oriented to external needs – since it was not used to support and diversify other economic activities that could potentially support regional development (Hall, 2011; Bunker, 1985).

Tabasco is also an example of an "exclusionary accumulation" economy, characterized on one hand, by the existence of an oil sector with high productivity, income and labor stability, and on the other hand by an agricultural sector with low productivity and salaries (Allub, 1985, p. 352). The lower income

the discussion on the Plan Chontalpa, scholars identified as one of the most important impacts the creation of *ejidos*, which replaced "traditional" collective family and community-based organizations. *Ejid*os in that context were understood as alien to the local organizational forms. In Allub's (1985) analysis referred above, *ejidos* are conceived as part of "traditional" local production arrangements. This highlights the need to understand historical local dynamics before we attribute the category of traditional to any structure, process or person.

rates – less than the minimum wage – were concentrated in the agricultural sector; the industry and activities related to Pemex were up to three times higher than the minimum income (Negrete, 1984, p. 102).

The activities involved in oil exploration and drilling, and the construction of pumping stations and pipelines, fragmented the already deteriorated wetland ecosystems in the Gulf of Mexico (Wilson & Ryan, 1997). These activities also displaced peasants from their lands, by both the expropriation of their lands and by the ecological damage and contamination that has resulted in the abandonment of their agriculture and livestock activities (Negrete, 1984). The oil industry impacted peasants livelihoods, which has meant “peasants’ violent abandonment of their way of life” (Velázquez, 1982, p. 170). As Tudela (1989) explains,

[The] government’s oil program was designed with a technocratic view; in its beginnings, this project was an alien, a project that did not take into account local development needs. The oil company did not feel committed with Tabasco’s local circumstances... their consideration would have meant an obstacle in the industry’s compulsive expansion plans (p. 339).

In the study area, fishers explained the many impacts the oil industry has brought to their communities, not only in terms of their life,³⁰ livelihood and health, but also in terms of the reconfiguration of these communities’ social and political relations. The relationships between Pemex and peasants and fishermen has been based on the deployment of two strategies: on one hand the

³⁰ In 1976, during the oil boom, oil-related accidents were the third cause of death in Tabasco, 30% above the national average (Tudela, 1989, p. 344).

instrumentation of corrupt patron-client relationships to coopt local leaders and social organizations; and on the other hand, the establishment of authoritarian and repressive strategies that have caused the death and imprisonment of many people.³¹

According to Scott (1998), the most tragic episodes of state-led social engineering in the context of high modernism emerged from the combination of four elements: the administrative ordering of nature and society, a high-modernist ideology, an authoritarian state, and a prostrated civil society that lacks the capacity to resist. As I have briefly explained, Tabasco's experience illustrates the combination of at least three of these elements; civil society, however, is not "prostrate" in the Tabasco context. Uribe explains that two visions prevail in the literature about the emergence of these types of high modernist projects in Tabasco. The first is the "systemic" approach that explains these interventions as the inevitable result of Mexico's insertion in the international market. The second is that they are the result of the willful initiatives of powerful politicians. However, Uribe argues that the emergence and development of these state interventions had as backdrop intense indigenous and peasant mobilizations and protests.

³¹ According to Velázquez (1982), Pemex strategies to deal with local conflicts change according to the political and economic power of the actors with whom they negotiate. In the case of the big agricultural entrepreneurs – who also have powerful political networks – Pemex compensates for the damage of oil on their lands, following a cooperative strategy that recognizes the direct and indirect oil pollution impacts on their lands. However, in the case of local peasants Pemex has an authoritarian relationship, dismissing damages and impacts. In this case Pemex imposes a "bureaucratic wall" against which peasants need to prove – using technical assessments – the damages caused by the industry, based on rules and procedures established by the oil company. Pemex-peasant power relationships, then, are based on the use of "expert knowledge" to deny damages, a scheme that implicitly regards peasants as "ignorant" and unable to fulfill the technical and bureaucratic procedures necessary to demonstrate their claims. In a broader analysis on the relationship between the state and social movements, Fox and Hernández (1992) argue that Mexican governmental responses to popular movements "typically combined partial concessions with repression, conditioning access to material gains on political subordination" (p. 167).

These state interventions, then, have been shaped by the active presence of fishermen and peasants who have struggled for their inclusion as participants and victims of these projects – negotiating resources³² and making claims about their impacts.³³

This activism and mobilization of local actors might also be explained in light of their social and economic exclusion. Tabasco is considered one of the poorest provinces in Mexico (CONEVAL, 2012). In 2010, 57% of its population was classified as living in conditions of poverty (CONEVAL, 2012, p. 12). Tabasco rated below national average indicators in access to social security (benefits, welfare, pensions), quality and lack of access to housing (housing with inadequate building material or high numbers of people living in a room); lack of social services (housing without access to water, drainage, electricity, or that use wood or coal to cook without a chimney in the house); and access to food (population with severe limitations in access to food so they can have a healthy

³² In 2008 a group of peasants met with the provincial governor asking that resources be channeled to revitalize the Plan Chontalpa, a project that, as I explained, has not received state support since the 1980s (López, 2008).

³³ Pemex's "carrot and stick" strategies have resulted in social protests and mobilizations. One of the most important social movements in the region was the Riverine Pact, a movement that emerged in 1976 mobilizing tens of thousands of fishers and peasants from many villages. Their main goal was to claim compensation for the many damages the oil industry had caused in their lands and water resources – salinization of their lands, fresh water pollution, etc. Velázquez (1982) explains that this mobilization emerged after many failed attempts on the part of the peasants to negotiate with Pemex – who until that time offered as the only response repression and threats. The peasants reached an agreement in 1980: the government would compensate with 4 000 million pesos; however, as Velázquez (1982) explains, only a few powerful local actors received their compensation – in 1997 only six thousands of sixty-three thousand claims had been processed (Town & Hanson, 2001, p. 35) – the majority of the peasants are still waiting. In my interviews peasants referred to the fact that they did not receive any compensation, and they coincided with Velázquez (1982) when they attribute this to corruption and the diversion of funds to political campaigns of the official party. As Town and Hanson (2001) explain, "Much of the money earmarked for reparations has instead been employed to strengthen party-state-industry relationships... The reparations funds have financed large construction projects in Villahermosa, been stolen by Pemex and state officials, and become part of the web of electoral financing designed to keep the state's ruling party in power" (p. 35).

and active life) (CONEVAL, 2012, p. 51).³⁴ In an extensive and one of the most important studies on Tabasco, where the different state interventions mentioned above are analyzed, Tudela highlights the existence of a development “paradox.” This paradox refers to the fact that in Tabasco, the historic periods in which malnutrition increases in the peasant population coincide with those stages where there has been an economic boom.³⁵ People’s malnutrition is among the social costs of progress (Tudela, 1989, p. 410).

3.3.2 The Coastal Communities

The case study includes five rural, extremely poor and marginalized coastal communities. The biggest and more urbanized community has about 1,600 inhabitants, and the other four range between 374 and 600 inhabitants (INEGI, 2010). Fishing is an old activity in this region. Fishers practice small-scale artisanal fishing with small boats (see figures 10-12).

³⁴ A researcher from a local university stated that “Tabasco has the same conditions that any African country,” an idea that conveys different problematic messages about how poverty is socially represented and how Tabasco itself is being envisioned under the loop of “progress” (interview with a scientist from a local university. May 31, 2012. Tabasco). It is worth mentioning that in the literature I reviewed on Tabasco, I found subtle language and messages in which representations of local inhabitants as backward or problematic, and concepts such as tradition and progress, were used to describe the region. In an interview, for example, a researcher portrayed fishermen as people who cannot always understand or interpret their contexts and social problems (interview with a scientist from a research center. December 12, 2011. Tabasco). These findings highlight the need to re-think our work as researchers that at times reproduce the very categories and concepts we aim to criticize. Scientists, then, need to be understood as active agents that in making their analysis carrying with them values that are reproduced in their work.

³⁵ Other studies support Tudela’s argument. Dewey (1981) studied the shift from subsistence to commercial agriculture and its impacts on the nutrition of preschool children in the Plan Chontalpa region. She argues that “when families are compared with respect to the crop diversity of their family plots and their degree of dependence on purchased foods, children of families who are more self-sufficient are better off nutritionally” (Dewey, 1981, p. 185-6).

In these places local fishers have virtually no alternative economic activity. They depend on fishing to survive. In interviews fishers reported that they were full-time fishers. However, there are some fishermen who have other additional temporary activities such as agriculture and livestock farming, but these productive activities were small-scale and for their own consumption. Therefore, it is possible that fishermen did not report these activities to me since they did not generate any economic income. Other kinds of income sources reported were remittances from family members who work in the province's capital city as maids, or in construction in Cancun. However in this latter case the fishers explained that their sons' income was just barely enough for them to survive in these places, to pay their rent and food, and they did not earn enough money to send to their parents.

Figure 10. A fisherman and his wife in a study community



Figure 11. Fishing Boats



Figure 12. Fishing nets commonly used to fish in the lagoons



The study communities are not places that were incorporated in the large-scale government interventions such as the Plan Chontalpa (the Chontalpa region is to the south of the study communities). Within the study region, only one of the study communities had a large farm (*hacienda*) with palm plantations; however, it only employed about ten people and was not productive anymore.³⁶ Migrants to these communities did not report having arrived to this region as workers from large-scale plantations from neighboring areas. They moved to be able to get a piece of land and exploit fishing resources in the area. The majority of them were peasants that came from nearby inland villages. Even though the study communities surround oil sites opened in 1976, I did not find anyone who reported having worked for this industry, nor had their family or neighbors in the community.

The majority of fishers exploit resources from three interconnected lagoons, but some of them – those with motorboats and nets – also fish in the sea (figures 13-15 show the three lagoons). However, as it is the case of other inland fisheries in the region, fishers also exploit resources from others environments such as estuaries, rivers, streams and marshlands (Mendoza et al. 2013). The Carmen-Pajonal-Machona lacunar system exploited by the communities in this study is Mexico's most important oyster producer (*Crassostrea virginica*). Mexico is one of the most important oyster producers in the world. It occupies the sixth place; specifically, the Gulf of Mexico contributes with 93.4% of the national production, (Pérez, Galmiche, Zapata, Martínez, & Meseguer, 2012, p. 134). In the Gulf of Mexico the neighboring province of

³⁶ Interview with a freelance fisher. December 14, 2011. Tabasco.

Veracruz is the main producer, Tabasco is the second most important – in 2011 Tabasco caught a total of about 13 thousand tons of oysters (CONAPESCA, 2011, p. 163). These communities supply the largest consumer population from the country, Mexico City – almost all their product was reported to go to this market. Fishermen organized in cooperatives exploit mainly oysters. However, other fishermen also fish for shrimp, crab, clam, winkle, nook, tilapia, wreckfish, sea bream, sea bass, shark, and dogfish.

Figure 13. Lagoon “El Carmen” part of the El Carmen-Pajonal-Machona Lacunar System



Figure 14. Lagoon “Pajonal” part of the El Carmen-Pajonal-Machona Lacunar System



Figure 15. Lagoon “La Machona” part of the El Carmen-Pajonal-Machona Lacunar



Women's participation in fishing activities is very important; together with their children they have the main task of shelling oysters. They also help their husbands fish in the lagoons. Pérez et al. (2012) describe the process as follow:

For oyster extraction, fishermen use instruments called scrapers, made up of two mangrove wood sticks joined in the middle as if they were a pincer. Oysters are collected in tare weights and carried to the product stock and shelling plants. Shelling consists of extracting the oyster meat from its shell, an activity carried out by women whose family members are partners in the cooperative, and it is done in their houses (p.134).

Official data report the existence of more than two thousand fishermen in this region. However, as fishing officials recognized in the interviews, these official numbers are not accurate since only legally registered people appear in the data. As I explain further, the lagoon is accessed by thousands of fishermen from these and neighboring communities who do not hold any legal permit. There are three types of fishers – members of cooperatives, *permisionarios* or private fishermen, and “freelance” fishers – categories that also correspond to the stratified economic and political power these actors hold inside and outside their local communities.

Fishermen have restricted public access to the lagoons. Officially, the only people who are legally allowed to fish and market lagoon resources are the fishermen who have a government permit; the only type of fishers that get permits are the ones organized into cooperatives, or the private fishermen (*permisionarios*). But only the cooperatives get permits to exploit oysters; private fishers have permits for other lagoon species.

In the municipality there are thirty-two cooperatives, and nine in the study communities. The first cooperative was created in the 1950s. The total number of fishers officially registered in the fishing government office is 2,500. The largest cooperative has a total of 172 members.

Fishermen receive the benefits of being organized into cooperatives, such as government subsidies to buy boat engines, nets and gasoline. In the past they also received a subsidy during the closed off season, in the form of a temporary job with a fixed subsidized salary. Some fishers also explained that it is through the cooperatives that Pemex allocates the resources to compensate fishers when they cannot fish due to oil spills or other problems related to oil industry activity. Fishers' leaders reported reductions in state support: many subsidies and programs that they received in the past have been closed.

The cooperatives take turns fishing. Their members can fish wherever they want within the three lagoons, there is not a specific area assigned to each cooperative. Each member goes fishing twice a week. Each member receives a ticket that allows him to fish for a specific amount. In the interviews, fishers reported that at that time they were allowed to fish between 2,000-3,000 mollusks each time. At the time of the interviews fishermen reported they were paid 110 Mexican pesos for every thousand oysters they sold to the cooperative. However, they also complained that sometimes they receive much less, there have been times when they only received 80 pesos. From this amount they need to deduct the expenses they incurred before they sold the product. For example, if a fisherman needs to contract a woman to do the shelling, he needs to pay

thirty-five pesos for 1,000 oysters she shelled; they also need to deduct gasoline expenses. In sum, the fishermen explained, if they obtained a permit for 6,000 mollusks, they would receive about 600 pesos; from there they would pay 210 for shelling plus about 80 in gasoline expenses; they would end up receiving a total of 300 pesos a week. With this amount, as they explained, “it is impossible to subsist if you consider the costs of transportation to send the kids to school, to buy basic staples, gasoline, canoe reparations, to feed about four, six or more family members.”³⁷ To send their kids to school, for example, they pay about 100 pesos a week in transportation.

As the fishing authorities explained, fishermen must comply with certain fishing regulations. They need to fish species that have a minimum length of seven centimeters, and they also need to return green shells to the lagoons, in order to restock oyster banks. A third regulation they need to observe are the two closed seasons (one and a half months each). Figures 16-19 show cooperative buildings and some of their members packing oysters in plastic bags for the market.

³⁷ Interview a cooperative member fisher. June 8, 2012. Tabasco.

Figure 16. Cooperative building in one of the study communities.



Figure 17. Cooperative members packing oysters in plastic bags for the market.



Figure 18. Cooperative members packing oysters for the market.



Figure 19. Cooperative members selling their products to private dealers from Mexico City



A second type of fishermen are the *permisionarios*. These are private fishers who have the financial resources to buy their own equipment, boats and nets, and who also employ other fishers to work for them. In the municipality there are a total of fifty *permisionarios*. They have different types of permits to fish different kind of species, except oysters – only the cooperatives hold permits to exploit them. The *permisionarios* also receive public funds and subsidies. Some fishers explained that the *permisionarios* “exploit” their fishers, because they do not work directly in fishing, but send their workers to do so, and get most of the benefits of the catch. However, one *permisionario* explained that their employees get sixty percent of the catch, and that he gets only thirty percent. Furthermore, the public subsidies they receive are also meant to benefit their employees; however, many fishermen complained that they do not share the benefits. The *permisionarios* then hamper the trickle-down effect the government expects to generate by supporting these kinds of initiatives. *Permisionarios* are regarded as fishermen with strong political power and networks that benefit them through the assignment of projects funded by the fishing authorities. They have connections with provincial political leaders. They have the skill to navigate the many bureaucratic procedures to get funds. But most importantly, as many fishermen explained, they have the economic resources to skip the job for several days and spend money traveling to the city to apply for funding, to talk to influential people, to learn about procedures and new initiatives, etc. The majority of interviewees think that these type of fishermen exert their political and economic power to get better conditions to exploit the lagoon and sea resources.

However, other fishermen thought that *permisionarios* are like any other employer, a member of the community who also faces the difficulties of his own economic activity. Figure 20 shows some of the infrastructure built by permissionarios.

Figure 20. Permisionario's private warehouse and freezer.



As I explained above, an important problem that the local fishing official explained was that they do not know the precise number of fishers that fish in the lagoons or the sea, because only the head family member is officially registered either as member of a cooperative or as private fisher. However, in reality all family members exploit the resources, and also the majority of the members of these and the surrounding communities make their livelihood fishing. The fishermen who lack a government permit granting access to the lagoon and sea are called “freelance” or independent fishermen. This group of people is the poorest and most vulnerable (figures 21-22). Their main demand is to get permission from the government to create more cooperatives. However, fishing authorities are not issuing fishing licenses anymore; therefore, independent fishers need to work “illegally” with the many risks this job implies. They are the group most affected by the corruption of both the authorities and the organized fishers. Usually freelance fishermen fish without any legal protection, so if an authority catches them fishing they are at risk of going to jail and they are also deprived of their equipment, tools, nets and boats. This is a real threat. They explained that some could get up to seven years in jail and they could be fined for 30,000 Mexican pesos; and their fishing tools are never returned.

Figure 21. Freelance fisherman with his son.



Figure 22. . Typical house of a freelance fisherman.



Considering that the only way to meet their needs is fishing, a key problem is the closed season that lasts three months each year. If fishing is their only means to survive, freelancers, cooperative members or private fishers, take the risk to fish and sell their product through smuggling, in the black market. Some freelancers are still in jail, because as they said, during the fishing season they can negotiate with the authorities but during the closed season they are not able to negotiate; the authorities in this case follow the legal norms. Freelancers explained that when they are caught during the fishing season, they immediately gather together in the lagoon and “negotiate” with the authority: “We tell them [the authorities], either you take all of us or you don’t take any of us.”³⁸ The fact that they need to pay a bribe in exchange for being freed was implied in the interviews. As Pérez et al. (2012) explain,

A closed season is not exactly a threat, for it has the objective of regulating oyster reproduction, but the lack of clear policies around it, in order to respond to the needs of the poorest population, generates this perception. This is so because the population is highly dependent on oyster capture and shelling to generate earnings, yet without viable and clear options to substitute it, their food security is affected (p. 141).

Sometimes members of the cooperatives pass on to freelance fishers a ticket that allows them to fish legally. They get the tickets by buying them directly from the cooperative’s representatives. Other times they get these tickets from the people who buy their fish. They are called *fayuqueros* – people who buy something illegally. The *fayuqueros* buy the tickets from the cooperative’s

³⁸ Interview a cooperative member fisher. June 9, 2012.Tabasco.

representatives; they pay about 200 Mexican pesos for each ticket. They allocate those tickets to the independent fishers, so that the latter can get oysters and sell them to the *fayuqueros* directly, without drawing up a formal invoice including taxes. Some fishers recognized their close dependency on these dealers, who buy their product and give them tickets for free. There is also a social stigma against freelance fishermen, who are blamed for many of the problems the communities face; from some fishermen's perspective, they were responsible for polluting the lagoon or for doing nothing to protect their resources: "they are illegal therefore, they don't care."³⁹

The lack of economic alternatives for survival has forced people from these communities to migrate. In interviews I mainly gathered information about internal migration: young women usually go to the capital city to work as nannies; young men go to tourist areas places such as Cancun, to work in the construction industry. Other studies report migration to Campeche to work fishing sea cucumber (Pérez et al., 2012, p. 142). International migration is not as common as in other parts of the province such as, for example, the neighboring municipality of Paraiso, where women have been migrating to North Carolina, Virginia and Maryland to work for crab processing companies since 1989 (Pérez et al., 2012, p. 127).

Fishermen explained that members of the cooperatives and freelance fishermen live almost in the same material conditions. Some of them have small houses made of cement; most of them, however, have houses made of metal sheets or palm wood and mud floors. The *permissionarios* are seen as the people

³⁹ Interview with a private fisher (*permissionario*). December 9, 2011. Tabasco.

with more economic power and this is reflected in their bigger households, more property – land, vehicles, fishing equipment (figure 23). These different types of fishers are closely interconnected with each other; freelancers have cousins who are cooperative member fishers. Private fishers have daughters who are married with cooperative member fishers, etc. These kinship interconnections explain some of the cooperative practices I found especially between freelancers and cooperative member fishers (figure 24).

Figure 23. Typical house of a permisionario or private fisher.



Figure 24. A cooperative member.



The people I interviewed brought poverty conditions into the discussion. While doing fieldwork, it was common to see children on the streets during school hours; when I asked a group of four children why they were not at school, their grandmother told me that they did not want to go because there they got hungry. The family could not afford the first meal of the day for the children. It was noon and they had not had any meals. Their mother migrated to the capital

city, and she was single mother. Most of their shacks have only one large room; the kitchen is outside the home. The majority of the young population has completed only primary school; there is no high school in their communities, and they cannot afford to pay for transportation to go to the villages where the school is located. It is common see young women between sixteen and eighteen years of age at home. Pérez et al. (2012) provide a testimony from a local 47-year old teacher in one of my study communities:

The young women here become stuck; they get together with young men (as a couple) from a very young age, 14 or 15 years old, because the father cannot support that many mouths. Since they are girls they teach them to make tortillas, rice, and get prepared for what will be their future work: the household and shelling” (p. 134).

Young men in these communities face an uncertain future as well. Even if they belong to a family where the father is a cooperative member, they do not have full rights to access and exploit the lagoon resources. Their fathers pass them the ticket so they can fish legally. However, since there is only one ticket per member they usually add to the ranks of the freelance fishers, fishing illegally, engaging in extra-legal practices to get and sell their products. A common ideal of all the young people interviewed is that “they want to change the system.” They want to end the practices that according to them have done more damage to their communities and the cooperatives than good: corruption of their leaders, under the table negotiations with fishing and oil representatives, despoliation of the goods that belong to the cooperative members, the diversion of funds, among many others. In interviews the young people – in their early 20s

– thought their parents had failed. The new generation of young people, they said, needs to make a change. The common complaint was corruption, like a disease that permeates and destroys their organizations and communities (figure 25).

Figure 25. Former cooperative building, now empty and un-used. The cooperative directive is in a lawsuit with government agencies taking legal action for misuse of funds and other legal charges against cooperative leaders.



In interviews, a different picture came from the older generation of fishermen. A former cooperative leader said explicitly that he accepted becoming the cooperative leader because he wanted to benefit from the many funds that flew through the organizations: “I wanted to take, to use this opportunity to get something for myself, but I could not find anything to get, so it was a disappointment” he said.⁴⁰ In this narrative, his ideas appeared to be common sense, a normal course of action expected from someone in a leadership position.

Other narratives portray the existence of an “ideal past” that was more or less perfect: the cooperatives were well-managed, there was no corruption and the state funded them with many subsidies and projects. It was a time when only two large cooperatives existed. However, since the 1990s everything changed after the government provided more permits and about nine new cooperatives were formed. In the past, these fishermen said, community members complied better with their social commitments. Before, every family used to restock the lagoons with shells, unlike these times where only few do that. In the past they used to restock because they were conscious about the need to protect their resources, they said. Unfortunately, they explained, the government started to spoil their communities because public funds were used to pay to people to restock: before it was for free, now people do not do it unless they get paid (figure 26). Before, fishermen only fished mature species, and now they devastate everything: they fish small sizes, interrupt the reproductive cycle of many species, and use nets that are not appropriate or that are illegal for fishing.

⁴⁰ Interview with a former fisherman leader of a local cooperative. December 12, 2011. Tabasco.

Figure 26. Piles of oysters' shells along one of the study community's coast. The shells were usually used to restock the lagoons; in this community fishermen throw them in their backyard.



Parallel to this narrative fishermen explained another one: the first two cooperatives, the only ones and largest of Tabasco, had financial problems, the leaders committed fraud and tax evasion, and they also diverted public funding. Legal allegations are still underway in Mexico City. In the past things actually worked differently but not necessarily because people were more conscious

about the need to protect the lagoon or marine resources and their communities, but because “they were other times”: people never restocked the lagoon because there was no need to do that, there were few fishermen exploiting the lagoon and the resources were abundant in this region. In interviews, “abundance” of resources was the word most used to describe the old times: a great variety of fish, crustaceans, mollusks and reptiles were fished.

Fishermen explained that population growth and lack of state support are the two important events that are key to understanding the crisis that cooperatives and their communities experience. Some fishermen blamed migrants from the neighboring province of Veracruz – who migrated to these communities in the 1950s – as the cause of many of the communities’ problems. Migrants caused, for example, the deforestation of coastline where they decided to build their settlements. Therefore, they caused the disappearance of mangrove resources such as beach grape (*Coccoloba uvifera*) and other native species that functioned as a natural wind-braking barrier against hurricanes and storms. They explained that since immigrants arrived everything changed in the community: overexploitation of natural resources; native community members’ dispossession of land, fishing and other natural resources; community fragmentation; and the introduction of drugs are also part of the many damages, among other problems. But probably the most significant structural change introduced by fishermen from Veracruz was the introduction of their fishing techniques, tools and stronger boat engines that transformed the traditional small-scale way of fishing in these communities into one that is more intensive,

commercially-oriented and also more destructive, as the fishers explained. Only a few years of *Veracruzanos* arriving was enough to position this group as the most important – political and economically – displacing locals leaders “who did not have a business vision, who did not exploit the resources on a large scale.”⁴¹ They have held political power within the cooperatives; they become their leaders, using their political networks with the provincial and national government officials. They also started the “claims-making business” against Pemex.⁴² As a local teacher explained, the *Veracruzanos* taught the locals “how to make their claims against Pemex effective, the types of tricks the locals need to use to get their compensation.”⁴³ Therefore the *Veracruzanos* are also related to the emergence of corruption within the cooperatives, and in the communities in general.

There are a lot of disagreements among fishers. They think of “the other” as someone selfish, corrupt, who only thinks of himself instead of thinking of the community’s welfare. In interviews they recognize that as a community they are divided. Politically, there are important divisions between two main political party constituencies, the PRI and the PRD. In one of the communities there were two local representatives from each of these two political parties – both claimed that they had won the election, both served in their offices as the local representative. However, they also recognize that when it comes to negotiations with or

⁴¹ Interview with a high school teacher from one of the study communities. June 11, 2012. Tabasco.

⁴² In an interview, a local teacher explained that fishermen and peasants in Tabasco grow damage “compensations” from Pemex, not crops, not food. The popular expression of the “reclamation business” refers as well to the fact that according to some non-fishermen community members, fishermen have made of Pemex’s compensations a way of living, a means to make their livelihood (June 11, 2012. Tabasco).

⁴³ Interview with a high school teacher. June 11, 2012. Tabasco.

struggles against the oil company (Pemex) they are very well organized and united. They mentioned that as fishers they are not divided, but they are citizens with different political interests and parties. In fact, the fishers from my study communities are known in Tabasco as the strongest and well-organized fishers from the province.⁴⁴ A leader said that during their meetings and to avoid problems, they “do not talk about politics.”⁴⁵ As I explain below, their relations with Pemex have been very conflictive, a factor that has at times made them organize to struggle together to make their claims.⁴⁶

In the interviews fishers identified oil pollution, overfishing, decreasing catch rates and total yields, and lack of markets as their main problems. A constant complaint was the lack of government support for the fishing sector; fishermen also discussed other issues such as a new fishing law that promotes fish farming, the failure of oyster and shrimp farming government projects implemented in these communities, and the law that forbids fishing close to the offshore oil infrastructure. Other important problems they mentioned were their need to get support and advice to manufacture their product. Some referred to problems with the middlemen that sell their product in Mexico City.

I observed some problems that the fishers never referred to as their immediate problems, nor were they raised when fishers were discussing overfishing or lack of production, such as the lack of enforcement in the

⁴⁴ Private conversation with my supervisor, who has been studying this region for a long time.

⁴⁵ Interview with a local fishers' leader. December 21, 2011. Tabasco.

⁴⁶ In the interviews private fishermen and some cooperative and local leaders were closely related to the official political party PRI. On the other hand, the “freelance” fishermen politically identified themselves with the opposition, with the PRD; they remember when a local governor from this party, an important national leader, channeled public funding - gasoline and tool subsidies - to their communities.

implementation of the regulations regarding access to lagoon and sea resources. Everyone can fish, legally or illegally – there is an informal agreement about this, covering each other if needed. There is also a lack of enforcement of regulations around fishing certain species: fishermen can fish any species they want even without a formal permit. If the authority catches them they will report this production as a result of “chance” or accident. At the time of my fieldwork there was more shrimp production in the lagoon than ever before, and many fishers did not have the license to fish this species, but they did it anyway since there was a lot of production. There was tuna available in the sea, and fishers did not have license for this species either, but they fished it anyway. Another problem mentioned often was the lack of government oversight about the type of fishing nets fishermen use. One of the fishers’ leaders referred to a new fishing law that had been discussed in the Congress. On one hand he was complaining about the law, because for them it would mean more regulations, surveillance and more health rules and requirements. On the other hand, he mentioned that through this new law fishers would be regulated to use appropriate nets to fish in the lagoon and in the sea. He mentioned the environmental impacts of using different nets that should not be allowed in the lagoons.

The three key environmental problems that fishers discussed were water and oil pollution, overexploitation of fishing resources, and lagoon pollution from garbage and urban and industrial wastewater. In the study area, fishermen defined their vulnerability in relation to the impacts and transformations brought

to this region by the oil industry since 1970s (figure 27). The state-owned oil company is at the center of fishermen's problems.

Figure 27. Oil well originally opened in the 1970s but never exploited. It is located in the backyard of a house in one of the study communities.



The study area has been subjected to oil spills since 1937 (Bozada & Namihira, 2005). Fishers explained, as other studies also note, that Pemex dumps “wastewater filled with heavy metals into nearby rivers and unlined holding ponds” or into the marshlands (Town & Hanson, 2001, p. 34). Fishermen also referred to acid rain associated with Pemex activities and facilities as a main cause of the loss of crops and declining land productivity. They commented on their unproductive palm trees and other types of plants that in the past used to be productive in their yards; they talked about the pests and diseases that kill them as a result of oil pollution. They also reported other impacts of this acid rain, which eats away “zinc roofs, ruining crops and polluting water supplies” (Town & Hanson, 2001, p. 34).

As I explain in chapter 4, in the study region one of the most important transformations introduced by the oil company was the opening of an artificial connection between the sea and the lagoon – the Boca de Panteones – in 1975. This had long-lasting negative impacts transforming not only lagoon ecosystems by increasing salt water flow to the lagoons, but also affecting the livelihoods of many people that suffered from the flooding of their lands and the salinization of until then fertile soil that was used to cultivate a wide range of crops. The introduction of water also impacted the oyster production in this area. Scientists explain that the salinization of the lagoons caused a process of ecological succession that due to its magnitude is of unique character in Mexico (Bello et al., 2009, p. 488). Among the many changes induced by this process have been: the substitution of freshwater species by salt water fish from the ocean

population; the replacement of wetlands by lagoons; and the replacement of wetlands for pasture and farming land. Other changes include coastal sedimentation, changes in hydrological systems, lagoon silting, the total disappearance of oyster banks and the salinization of pasture land used for livestock farming. During interviews, the fishers from these communities raised this issue, over and over again. Even though Pemex compensated some peasants for the loss of their lands and production, peasants are still demanding justice for this damage.

Fishermen define their vulnerability not only in relation to the impacts of such industries on their livelihood, but also in terms of the impacts on their well-being and health. They complained about the different pipeline explosions that this region had experienced, that have injured and killed people. They also referred to health issues they believe are related to the oil industry. Scientists have conducted studies identifying the spread of pollution related to the oil industry in fishing areas and species. They registered the presence of pollutants above the levels permitted by the national law and by the parameters of other international health institutions. They have also identified health problems among the population: elevated exposure to carcinogens, miscarriages, negative effects on children's physical growth, and diverse social and economic impacts (Bozada & Namihira, 2005). Fishermen are aware of such studies so they brought them into the discussion.

Along with the discussion of these impacts fishermen also referred to lagoon pollution from industries that pour their wastewater into the rivers. They

mentioned that almost every year, when the rainy season starts, there are a lot of dead fish floating in the lagoon. They explained that chemicals raise the water temperature, killing some species of fish. There have been studies that show the presence of metals and hydrocarbon in the lagoons in the study area – and in some fish species – as a result of liquid wastes from sugar refining and petrochemical industries, the use of fertilizers and pesticides by the agriculture industry, the intensive oil extraction and refining, and as a result also of the large number of oil industry accidents (Botello, Gofi, & Castro, 1983; Vázquez & Pérez, 2002; Rosas, Báez, & Belmont, 1983; Rodríguez, Jiménez, & Valenzuela, 1995).

Finally, it is important to mention that when complaining about Pemex, one of the fishermen was very cautious about any misunderstanding when he clarified that: “we are not against Pemex, oil is a public good, it is good for Mexicans, it is not that we are against the well-being of the country, but we have problems with the company that need to be resolved.”⁴⁷ Fishers make clear through this and similar statements that the “national interest” used in government narratives to justify the promotion of its initiatives should be carried out without impacting the local inhabitants’ interests. As a peasant testimony put it: “oil is not for the nation... it is only for a chosen few” (Town & Hanson 2001, p. 34). At the core of the problem are then, issues of inequalities and the costs of externalities, a burden carried by local populations where the industry operates.

There is a study that discusses a kind of “disillusionment” about this industry’s benefits for local people, arguing that local populations “have not seen the benefits of the wealth being pumped out of their state” (Town & Hanson

⁴⁷ Interview with a cooperative member fisher. December 15, 2011. Tabasco.

2001, p. 35). However, in my interviews fishers did not show any kind of disillusionment based on any type of expectations on this industry. They did not mention for example, the industry's role in generating employment for their communities. Fishers did not associate their well-being with the oil industry – e.g. as wage-earning workers. Their identity as fishers permeated their expectations: to have better equipment, to enforce resource exploitation rules, to organize better, to promote their markets, among others.

In the following two chapters I take up some of the ideas I discussed above. I analyze in depth fishers' views on coastal erosion and some of the local struggles and communities' challenges discussed in interviews.

CHAPTER 4. PROBLEMATIZING COASTAL EROSION NARRATIVES

4.1 Introduction

This chapter analyzes how Mexican governments, scientists, and local fishers have explained coastal erosion. Coastal erosion is regarded as one of the most important phenomena facing coastal communities worldwide. The rates and impacts of coastal erosion in the Mexican communities examined in this case study are astounding. Mexican scientists and governments have characterized these communities as “highly vulnerable” to climate change due to coastal erosion. Coastal erosion has had important impacts on these communities. Dozens of homes and public buildings (e.g. a school) have been destroyed (figures 28-31). People have been displaced from their houses and have had to find other places to live, without any kind of government or community support. They have also been isolated due to the destruction of roads and bridges. People reported that this isolation has had economic impacts as well, since they are now paying more for staple goods and services such as transportation. In interviews, some local inhabitants expressed the thought that their communities will disappear sooner or later.

Figure 28. Coastal erosion impacts on housing.



Figure 29. Coastal erosion impacts on housing.



Figure 30. Coastal erosion impacts on housing.



Figure 31. Coastal erosion impacts on roads.



In this chapter I examine coastal erosion as it has been explained in the narratives (Roe, 1991; Forsyth, 2003 and 2008; Fairhead & Leach, 1995) that Mexican governments produce in the context of their climate change programs. I also discuss explanations of coastal erosion by scientists studying this phenomenon, and by local fishers living in coastal communities. I argue in this chapter that government narratives depoliticize and dehistoricize environmental change by overlooking historic and contentious political issues that are at the core of the emergence of local environmental changes.

Coastal erosion is a phenomenon that occurs when a beach loses its sediment (Anthony, 2005); it is the landward displacement of a given point between the ocean and the continent (Lizárraga and Fischer, 1998, p. 1234), resulting in “the encroachment upon the land by the sea” (Doody et al., 2004, p. 4). Scientists explain that this phenomenon has two important characteristics: it is universal, and it is changing at rapid rates (Titus, 2005). It has been estimated that more than 70% of the world’s sandy coastline has retreated (Bird, 1987, p. 151). Coastal erosion has also been identified as one of the physical effects of sea-level rise resulting from climate change. It has been characterized as a hazard for the increasing populations that inhabit coastal areas around the world, for their economies, and for the natural ecosystems that are at risk of disappearing. This phenomenon has motivated the concern of governments and research institutions and prompted the release of studies, assessments, and policy instruments in both developed and underdeveloped regions (Doody et al., 2004; Marchant, 2010; Leatherman & Nicholls, 1995; Thieler & Hammar-Klose,

2001). Despite all this attention, scientists note that coastal erosion is a complex and poorly understood phenomenon.

In the study region, provincial and national governments and international organizations produce initiatives in which coastal erosion is framed as an important problem that coastal communities encounter in the context of global environmental changes. In this narrative, coastal erosion is explained as an extant and potential sea-level rise impact that results from climate change. Although in programs and plans governments recognize the existence of many intertwined social and economic processes that contribute to coastal vulnerability, key narrative emphasis is put on climate change as the main factor that justifies government intervention. In the Mexican context, this narrative is being translated into particular projects that aim to deal with coastal erosion prevention and impacts.

In considering other explanations of coastal erosion, it becomes clear that using climate change discourses can be misleading and problematic. This government narrative excludes other important factors that scientists and local fishers observing environmental changes in their villages have identified as contributing to this phenomenon. The accounts of scientists and local fishers coincide when they identify coastal erosion's characteristics, the factors causing it and the type of solutions proposed, and these ideas challenge the government narrative in several respects.

Scientists state that the very complex nature of coastal processes makes it very difficult to establish a causal one-dimensional relation between sea level

rise and erosion. They emphasize that coastal erosion is the result of both natural and human-induced factors that operate at different scales. Specifically in the study communities, Mexican geologists have concluded that coastal erosion in Tabasco's coasts has been primarily caused by land subsidence – the gradual caving in or sinking of land – induced by the extraction of ground water and oil. Coastal ecosystem's scientists have also explained that erosion is a natural event, part of coastal cycles, a phenomenon that becomes a problem when nature does not have enough room to accommodate change due to the existence of infrastructure and urban developments.

Local fishers also have their own versions of coastal erosion, which agree with scientists' explanations in many ways. Fishers' views challenge government ideas regarding coastal erosion as a phenomenon that is caused by climate change. Their perspectives are informed by a particular political economy context, specifically, the role of the state-owned oil industry (Pemex) that has historically impacted people's livelihoods and environments. Fishers argued that the building of Pemex oil infrastructure was the main factor causing erosion in their coasts. They also mentioned the building of urban and industrial infrastructure – oil pipelines and roads – along their coasts as factors causing erosion. One fisher also mentioned land subsidence as a possible cause of erosion. Finally, from some fishers' perspectives, coastal erosion is a natural phenomenon as well.

I argue that adopting climate change frameworks to explain long-term environmental changes like coastal erosion allows the Mexican government to

sidestep contentious local political issues that are at the core of the emergence of such biophysical phenomena. Science and Technology Studies (S&TS) scholars have stated that scientific knowledge “is not a transcendent mirror of reality. It both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments and institutions” (Jasanoff, 2004, p. 3). Coastal erosion is a case in point; it has historically been framed by different scientific approaches – climate change, geology and sea science studies – that raise interesting questions addressed by S&TS studies, such as:

What makes problem formulations change over time or, alternatively, cohere across different historical periods and political systems? How do issues come to be perceived as natural or technical rather than social, as public rather than private, or as global or universal rather than local? (Jasanoff & Wynne 1998, p. 5).

Rather than verifying whether interpretations of coastal erosion are right or wrong, in this dissertation I am interested in the contentious politics, in the need to recognize the existence of a diversity of views and explanations of environmental change. The recognition of other actors and perspectives is a contentious issue because it opens up discussions about how problems are defined and by whom, and more importantly, about what counts as a problem in the first place.

In the next sections, I analyze Mexican governments’ narratives about coastal erosion, followed by fishers’ and scientists’ views and explanations of local environmental change. I offer some final remarks at the end of the chapter.

4.2 Government Narratives: Framing the Climate Change Problem

Government initiatives in Mexico draw on the predicted impacts that coastal ecosystems are expected to experience based on sea-level rise rates projected under different IPCC scenarios. Based on the foreseeable impacts on natural and human systems, Mexican governments consider climate change “the most relevant global environmental problem from this century” (CICC, 2009, p. i). This account is based on a broader grand crisis narrative, which explains that “global-scale climate change is causing physical environmental changes putting human communities at risk” (Bravo, 2009, p. 258).

Government narratives mention three strategic factors that justify the implementation of climate change initiatives in the Gulf of Mexico. The first is the region’s location within the cyclone path, making the area highly vulnerable to climate change. The second is that the region has a strategic role in the Mexican economy, with two of the most important economic sectors in the nation occurring in the area: tourism and oil production. Finally, the environmental characteristics of the region are another justification for implementing climate change initiatives: 75% of the country’s coastal wetlands are located in the Gulf of Mexico; their ecological particularities make them the most productive ecosystems in the country, accounting for 45% of the country’s shrimp production, 90% of oysters, and about 40% of total fish production (Cervantes & Buenfil, 2009, p. 38).

In the case study, coastal erosion has been framed as one of the several climate change impacts facing coastal ecosystems. According to governments’

narratives, Tabasco's intrinsic vulnerability is due to its location and specific characteristics – geography, hydrology, geology and geomorphology. Tabasco is highly vulnerable to two hydrometeorology climate change related impacts: floods and sea-level rise (SERNAPAN, 2011). The National Strategy on Climate Change identifies five critical regions in the Gulf of Mexico with higher risk of floods due to sea level rise, one of which is the area and communities included in this dissertation case study: the Machona Lacunar system (CICC, 2007).

Based on the sea level rise projections estimated by scientists in Mexico, Mexican government agencies explain that if sea level rises one meter it would seriously affect eight Mexican provinces, including Tabasco. In Tabasco, these changes would impact about 8% of the territory (CICC, 2012a, p. 50). Government narratives explained that in the last IPCC report (2007), a sea level rise of between 18 and 59cm was predicted between 1999 and the end of the 21st century. However, government reports argue that “this is a conservative prediction,” since there have been more recent studies that indicate greater sea level increases expected during the 21st century (CICC, 2012a, p. 50).

Government reports (CICC, 2012a; CICC, 2010) include important implicit assumptions. For example, in the Fourth National Communication to the United Nations Framework Convention on Climate Change, in a section that discusses sea level predictions, the text refers to a footnote in which it is clarified that these predictions present “uncertainties” (CICC, 2010, p. 136). As I discuss further in chapter six, recognizing the existence of uncertainties in the process of predicting scenarios is very important, and deserves a more serious and explicit

consideration in the presentation of information on climate change. Uncertainty has a special relevance if we consider that these scenarios are tools that governments use to classify the degree of vulnerability of people and places, and with this, the sites where adaptation programs and other initiatives are going to be implemented.

In pointing out the existence of different sea level rise scenarios that situate the IPCC predictions as “moderate,” government agencies second the positions of glaciologists and oceanographers who think that the IPCC’s was a conservative prediction (Hulme & Mahony, 2010, p. 711). However this is not a position that the government recognizes or takes overtly, but rather one that I infer through the ideas presented in government reports. After presenting the possibility that the 1m scenario is conservative, the report “Climate Change Adaptation in Mexico: Vision, Elements and Criteria for Decision-making” (CICC, 2012a), continues with a set of predicted impacts resulting from scenarios crafted by national scientists who predict impacts “if” sea level rises more than one meter. These narratives do not explain what rationale these scientists used to define this parameter, nor, as I explain above, do they address the uncertainties in the data they present.

By presenting data and discussing sea level impacts in Mexico in this way, I argue, government agencies are sidestepping important and contentious scientific debates: on one hand there are scientists who think that the IPCC sea level predictions were the product of “scientific reticence” (Hulme & Mahony, 2010), while on the other hand there is a group who thinks that:

[I]n fact no consensus could be reached on the magnitude of the possible fast ice-sheet melt processes that some fear could lead to 1–2 m of sea-level rise this century. Hence these processes were not included in the quantitative estimates (quoted by Hulme & Mahony, 2010 p. 711).

By omitting these debates within their narratives, Mexican government agencies frame “the climate change problem” in a very particular way, which many would characterize as simplistic (reductionist) and catastrophist (alarmist). This example also illustrates the important role that government officials play as “translators” of data and ideas that are derived from international agencies such as the IPCC and Mexican scientists producing local predictions. In the process of presenting public reports and data, these officials also produce and frame climate change and knowledge themselves.

The footnote on uncertainty that I mentioned above also states that there were many factors accounting for sea level changes besides climate change, such as coastal currents, hurricanes and storms, tsunamis, and thermal dilatation. This clarification has special relevance since, as I will explain further in this chapter, at the core of scientists’ discussions is precisely the complexity of attributing coastal erosion to any particular factor – in this case sea level rise.

Other Factors Accounting for the Problem of Climate Change

Government narratives highlight the need to address climate change impacts of phenomena like erosion, but rarely explain the particular impacts that these phenomena have on local communities. In the Tabasco Climate Change Plan,

for example, the document explains the urgency in addressing climate change impacts such as coastal erosion, making implicit its impacts on coastal communities through pictures showing the destruction of houses along the Tabasco coasts. In another document focused on gender and climate change, that was elaborated by an NGO and financed by the government, the government narrative highlights two potential impacts of coastal erosion on people living in affected areas, specifically mentioning that coastal erosion reduces possibilities in both food production and people's occupational choices (INDESOL, 2010). Unfortunately, this is a general statement that is not explained in depth; the question of how food production and people's choices are interrelated with erosion is not clear. In my view, these kind of statements illustrate the lack of expertise of some researchers working on the topic of climate change impacts as well as the multiplicity of voices – in this case NGOs – shaping these narratives.

There are some parts of the government narrative that acknowledge complexity. The report written by scientists on the project Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico (hereafter the Wetlands Report) promoted by the World Bank, recognizes that climate change impacts are one of many sources of environmental and social changes facing local coastal communities (Buenfil, 2009). The report highlights other important problems for the region, including water pollution stemming from untreated urban and industrial wastewater, agricultural runoff containing fertilizers and pesticides, and spills from oil extraction, transport or refining (Buenfil, 2009, p. 27). Coastal

ecosystems experience degradation, conversion of coastal wetlands to other uses, and the industrialization and overexploitation of fisheries. Experts also explain that the deforestation of forests and mangroves is occurring at alarming rates (Buenfil, 2009, p. 26). The main causes of this loss of vegetative cover are the expansion of agricultural and livestock activities, and the development of urban and industrial infrastructure – including developments to accommodate tourism (Buenfil, 2009, p. 27-28). Government initiatives in the region emphasize that climate change is likely to exacerbate the potentially cascading effects of these threats to coastal ecosystems. These documents also recognize that “Mexico’s poorest areas and sectors show high-vulnerability conditions to climate change” (CICC, 2012b, p. 28).

However, the question of how this complexity will be addressed within climate change programs is not clear. The governments’ strategies to face climate change impacts are based on the reduction of natural ecosystems’ vulnerabilities by implementing conservation, restoration and sustainable management plans (CICC, 2012a, p. 56). For example, the Wetlands Report has the goal of reducing coastal wetlands’ vulnerability to climate impacts by implementing adaptation measures. Pilot sites were selected to introduce this initiative, in areas that experts considered “the most vulnerable places, with the largest population at risk, and high exposure to potential impacts from climatic events” (Buenfil, 2009, p. 30). My research area includes some of the fishing communities included in one of these pilot sites—the Carmen-Pajonal-Machona Lacunar System. In my study area, this initiative proposes adaptation measures

such as: reforestation with native species; the strengthening of the sandbars that separate the coastal lagoons from the sea; and the development of a wetland conservation and management strategy (World Bank, 2008, p. 8).

Regarding the proposed measure of the strengthening of the sandbars in the study area, the initiative does not explain in detail the type of material or infrastructure proposed to strengthen and protect the coastline. As I discuss further in this chapter, the building of what is called “hard” infrastructures – seawalls, dikes – is a topic of discussion among experts studying these types of infrastructure in different regions in the world. Experts state that although this type of shore protection structure aims to reduce damage caused by flooding, wave attack, or erosion, they in fact have adverse effects, including shifting erosion and other environmental problems to nearby locations (Nicholls et al., 2007; Doody et al., 2004; van Rijn, 2011; Kraus, 2005; Correa, Alcántara-Carrió, & González, 2005; Titus, 2005; Ortiz, Sommer, & Oropeza, 2010).

Government initiatives explain that in the Gulf of Mexico the oil industry’s infrastructure is one of the most vulnerable to climate change, and it is a government priority to develop adaptation policies to protect them (CICC, 2012a, p. 64) (figure 32). Among such efforts is the building of infrastructure such as concrete, metal and synthetic walls (figure 33). As I discuss in the next chapter, governments’ narratives recognize both the significant environmental impacts the oil industry has had on the region, and at the same time the strategic need to protect its infrastructure from rising sea levels, coastal erosion and increasingly frequent storms. In this case, the Mexican government is facing a major

challenge in its attempts to reconcile two projects: reducing local people's vulnerability and supporting oil extraction, one of the main local sources of such vulnerability.

Figure 32. Coastal erosion impacts on oil infrastructure (pipelines).



Figure 33. Sea walls to protect Pemex infrastructure.



Finally, an important issue we need to look at when analyzing this particular case study in Mexico is the question of who is given responsibility for contributing to or solving environmental problems. In government narratives, it is clear that this responsibility falls differently on citizens, organizations, universities, and on local, provincial and national government agencies. It is citizens' responsibility, for example, to adopt sustainable productive practices or to develop adaptation practices to face climate change impacts. It is government

agencies' and universities' responsibility to design and implement adaptation projects; but it is also recognized that in order to successfully carry out these initiatives local people need to participate and be engaged in these actions.

4.3 Fishermen Narratives: Coastal Erosion is not “Natural” but a “Human-Made” Problem

The existence of multiple rationalities and values attached to environmental change is clearly evident when analyzing fishers' perspectives on coastal erosion. Fishers' understandings of this physical change are particularly different from those of the government, specifically in their attribution of the causes of coastal erosion and in identifying the actors responsible for providing solutions to this problem. In my interviews, I did not find any distinction between the different categories of fishers – cooperative members, freelancers or private fishers – regarding coastal erosion; they shared perceptions of their problems, the role of different actors in causing the problem and in providing solutions to it.

Based on the different challenges that coastal communities face in coping with climate change impacts, one fieldwork question I posed was how local fishers explain coastal erosion. I found that when asked about the environmental threats and problems that fishers thought were the most important for them and their communities, my interviewees never referred directly and explicitly to coastal erosion as a key problem. Instead, they mentioned issues closely related to their livelihood as fishers, such as sea and lagoon pollution — mainly oil and industrial pollution. Coastal erosion only arose as an important issue once I asked them explicitly about the problem. In these interviews, local fishers

identified environmental problems as a challenge for them when they were closely related to their ability to earn a livelihood. From their perspective, then, these other problems, such as oil pollution, fish production, or overfishing, have higher priority. This finding is important considering these communities' particular geographic conditions, which are determining their vulnerability to environmental changes. In some areas the strip of land that divides the sea and lagoons is no wider than one hundred meters, and during storms, the sea encroaches upon the land making a single body of water.

It is important to note that some fishers stated that erosion was not really taking place in the way that governments or other fishers described. This is particularly the case among fishers that inhabit one of the five communities in which this phenomenon is not as evident as it is in neighboring villages, where there have been erosion rates of 9 to 11 meters/year (Hernández, Ortiz, Méndez, & Gama, 2008). These fishers explained that coastline changes are part of a natural dynamic; they notice that after storms their beaches are eroded by the effect of storm waves, but that the sediments that were eroded are transported to other areas of the coast. Along this same line of thought, some fishers explained coastal erosion as a phenomenon that has always been part of their communities. Fishers have also been aware of coastal erosion for decades: people recall having to walk long distances from their villages before they could reach the sea. Fishers in their fifties, for example, remember that their grandparents told them that the shoreline was once closer to their villages than it

is now. There is, then, an idea that the coastline is constantly changing, and idea that shapes local risk perceptions around erosion and flooding as well.

The most important aspect of fishers' views that clearly challenges the government narrative is the idea that some problems attributed to nature or climate change are not "natural" in origin at all. From their perspective, coastal erosion is a "man-made" problem. They argue that the origin of this problem dates to 1975, when the oil industry opened an artificial connection between the sea and the lagoon – the Boca de Panteones (figure 34). At that time, the oil company (Pemex) was opening new sites for oil extraction in the region, and the artificial channel allowed the introduction of machinery and the transportation of oil. There are other opinions about the cause of this problem; some fishers argue that they suffer coastal erosion due to the fact that Pemex built a deepwater port in a city close to these fishing communities. Some fishers also explained that the extraction of sand from some of their coasts – used by Pemex to refill swampland and expand its infrastructure – is also changing coast profiles. As one of the fishers commented, "Pemex is responsible for changing or altering ocean currents, not nature as people think." In these fishers' view, the building of infrastructure to support the oil industry is the cause of coastal erosion.

Figure 34. Artificial Opening built in 1975 between the sea and the lacunar System.



In the government project on coastal wetlands – Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico (World Bank, 2008) – authorities do recognize the negative effects that this artificial opening has had on the region. In one of its adaptation projects to be implemented in these communities – the strengthening of sandbars – the World Bank states that measures are under consideration to partially reverse the artificial opening of the

“Boca de Panteones,” and to strengthen the existing sand bar in order to stabilize sand deposits exposed to coastal currents (World Bank, 2008). In this initiative, authorities recognize the negative effects that this opening has had, transforming not only lagoon ecosystems by increasing salt water flow to the lagoons, but also affecting the livelihoods of many people that suffered from flooding in their lands and from decreasing oyster production. During interviews, the fishers from these communities raised this issue over and over. Even though Pemex compensated some peasants for the loss of their lands and production, community members are still demanding justice for this damage.

These concerns are part of local fishers’ long-term struggle against the state-owned oil industry that has been operating in the region for decades. Fishers perceive oil pollution as the real threat to their economic activity, not coastal erosion. In these fishers’ perceptions, they cannot do anything about coastal erosion, since they do not have the material, financial or technological resources to prevent or solve it. In the case of oil pollution, however, they can at least negotiate and receive monetary compensation for their nets which have been made useless by oil contamination, or for the fact that they are obliged to stop fishing until oil spills have dispersed.

There is one other local account of the causes of coastal erosion. Fishermen who consider themselves native to these communities explained that migrant fishermen from the neighboring province of Veracruz, who migrated to these communities around the 1950s, caused coastal erosion when they settled on land close to the coastline. These migrants caused mangrove deforestation in

this coastal area, which the previous residents regarded as important for their villages since it functioned as a natural barrier against hurricanes and storms. The native fishermen explained that since immigrants arrived, everything has changed in the community: overexploitation of natural resources; native community members' dispossession of land, fishing and other natural resources; community fragmentation; and other social problems. In analyzing the impacts of this process, fishers blamed themselves for doing nothing at the time to prevent these migrants from taking over that land. But they primarily blamed the government for not preventing these settlements along the coast. Finally, in asking about other kinds of environmental problems, such as lagoon pollution, local fishers do not regard themselves as actors causing this problem. Interestingly, they refer to other communities far from their own towns, as sources of pollution.

In the opinion of local fishers, there are certain actors that have the lion's share of the responsibility for solving local environmental problems. When asked who has responsibility for responding to coastal erosion, the fishers answered that it is primarily the government's responsibility. There is a consensus that the government should be key actor in solving local problems; every fisher I interviewed attributed the main responsibility of dealing with these problems to the government. In their perception, it is the government's responsibility, for example, to monitor, control, and penalize lagoon pollution – by oil, garbage, or wastewater. These fishers perceive the government as being the entity responsible for solving or preventing the problem of coastal erosion, because

they think it is very expensive to get the technology to do something about it. Some of the fishers mentioned that in the past they organized themselves to fill sacks with sand and place them at the coastal edge to prevent erosion; however they did this only when the government provided them with the sacks. They reported that they have asked the municipal and provincial governments to support them by providing sacks, but also other subsidies – such as staple foods or economic support – to motivate people to help fill the sacks. In these examples, the fishers do not regard themselves as responsible for dealing with the problem, mainly because they do not have the material or financial resources to do so.

In some of these communities, the government has built some protections against erosion, such as seawalls constructed of stone, or concrete and rubble mound seawalls (figures 35). Fishers explained that, overall, these protections have not worked, with the exception of one case where the government put piled stones along the shoreline. Even though they doubt of the effectiveness of this technology, they still want the government to support their communities with these protections. They also reiterated the need to conduct scientific studies about currents' movement before the government invests in that kind of infrastructure.

Figure 35. Coastal infrastructure – geotubes - to protect the coast from erosion, These geotubes are replacing rubber tubes that were previously built in this area but that have been destroyed by the effects of the sea and also (as it was explained in some interviews) by people.



Government climate change initiatives put a strong emphasis on the need “to educate” and “increase the awareness” of the population about climate change issues. In 2009, a non-government organization gave a workshop on climate change – financed by the provincial government – in one of the focal communities of this study. I asked the fishers who participated in this meeting their opinion about it. One of them commented that it was “good to get this

information, but the most important thing is to act, not only to come and talk but to do something.” They did not think it was necessary for people to become conscious of the problem, but rather that the most important thing is to actually solve the problem. Again, these fishers do not think of themselves as key actors in solving such a complex, large-scale, and distant problem as climate change.

There are two other important ideas that arose in the interviews. The first is that when asked how or when local fishers heard for first time about climate change, the majority indicated that they had heard about this issue before the workshop. They said they learned about climate change by watching TV – the Discovery Channel was mentioned in particular. Climate change is an issue they had heard about, and in their perception the workshop did not improve their understanding of that problem. This is an important contrast to the government representative’s position that these types of workshops are necessary to educate local fishers or increase their awareness about climate change impacts.

Another issue that the fishers’ leaders mentioned was the fact that they had participated in meetings about climate change or coastal erosion with governments and international institutions like the Inter-American Development Bank, but that in terms of concrete actions, “nothing has happened.” In interviews, the fishers expressed disappointment and discouragement about these initiatives, especially because they had heard in newspapers and in the meetings that a certain amount of financial resources would be allocated to prevent coastal erosion in their region. In their view, local government

representatives must have engaged in corruption, since no money has been allocated to solve the problem.

4.4 Scientists: Coastal Erosion, a Socio-Natural Phenomenon

In this section I first address the definitions scientists provide about coastal erosion. In the following part I explain the multiple factors at play in generating coastal erosion, putting special emphasis on how scientists explain the interconnection between sea level rise and erosion. The third part of this section deals with the different approaches and criticisms scientists discuss to deal with “the problem.” The final part explains these topics as they apply to my case study.

4.4.1 Definitions

Coastal erosion is defined by scientists as a process by which a beach loses its sediment, resulting in a depletion of its sediment budget (Anthony, 2005); it is the process of “wearing away material from a coastal profile due to imbalance in the supply and export of material from a certain section” (Marchand, 2010, p. 6). Erosion occurs where “the beach can no longer balance energy produced by waves and by water piling up against it, leading to net sediment loss and lowering and retreat of the beach” (Anthony, 2005, p. 141). Erosion is then the result of “an imbalance between energy inputs on the one hand and, on the other, the resistance of the beach bed and sediment liable to be mobilized by the fluid forces” (Anthony, 2005, p. 141).

In the literature, scientists explain that coastal systems are one of the most dynamic ecosystems on the planet (Ruiz, Mendoza, Silva, Posada, & Mariño, 2010; Marchand, 2010); they are evolving complex systems that “show non-linear morphological responses to change” (Nicholls et al., 2007, p. 320). They also state that processes of erosion and accretion have always co-existed, evolving through large-scale redistribution of sediment, and that they are not always in equilibrium (Ortiz et al., 2010). From a geomorphologic perspective, then, extant erosion/accretion processes may reflect a cyclic repetition of past geologic processes, but varying in their intensity (Ruiz et al., 2010; Doody et al., 2004).

Marchand et al. (2010, p. 6) explain that understanding coastal erosion requires both insight into all the factors that interact along the coast, and an awareness of different time scales. Beach sands are supplied from four main sources: sand is washed down to the coast by rivers; it is derived from the erosion of cliffs and foreshores; it is blown to the coast by winds; and finally, it is washed in to the shore from the sea floor by wave action (Bird, 1987, p. 152). In geological time scales, coastal evolution is determined by the demand and supply of sediments; littoral sedimentary systems are dynamic environments that change according to waves, water currents and wind regimes (Alejo, Costas, & Vila-Concejo, 2005, p. 64). Scientists explain that coasts’ sediment demand is determined by the rate of relative sea-level rise (local increase in the level of the ocean relative to the land) and by the morphology of the coastal plain; sediment supply is determined by the availability of sediment and by the transport capacity

of wind and water (Marchand, 2010, p. 6). When coasts experience greater sediment supply than demand they will grow seaward; when demands equals supply, they stay in place; and when the supply is insufficient, coasts retreat (Marchand, 2010, p. 6). Erosion can result in the total disappearance of beaches, while the sediment lost in one section accumulates elsewhere alongshore, in other beaches, in estuarine and lagoon sinks, or in offshore sinks (Anthony, 2005, p. 141-142).

Coasts therefore exhibit natural variability, with a continual adjustment towards dynamic equilibrium, adopting different “states” in response to varying wave energy and sediment supply (Nicholls et al., 2007, p. 318). Beaches may experience short-term erosion as part of a morphodynamic cycle of beach adjustment to seasonal or nonseasonal changes in wave energy, and this period of adjustment may take days, months, or years (Anthony, 2005, p. 141). When a coastal system is able to maintain a balance between the sediment that has been lost and new material that has accumulated, then the system reaches a state of equilibrium (Ruiz et al., 2010). For some scientists, however, especially when considering longer time scales, coasts are never in equilibrium since they are continually evolving over time (Marchand, 2010). Coastal systems may present other states, such a static equilibrium, when the shape of coasts and changes through time are not significant; they also may exhibit what is called dynamic equilibrium when the beach experiences cyclical changes (Ruiz et al., 2010).

It is interesting to note that the literature reviewed here relies on a single source – Bird’s (1987) study – to discuss the magnitude of coastal erosion

worldwide. This confirms concerns about the lack of information and knowledge on this phenomenon worldwide; and it also questions the broader assumptions of scholars and governments when they make their arguments about climate change impacts on coastal ecosystems. Bird's study (1987) is based on surveys organized between 1972 and 1984, and includes information from 127 coastal countries. In his study it is estimated that more than 70% of the world's sandy coastline has retreated (p. 151). However this author and other sources using this data do not specify the time scale of this estimation. Bird also explains that on the global scale, losses of sand have been exceeding gains over periods ranging from a few years to several centuries (Bird, 1987, p. 154).

In sum, erosion is explained as a dynamic and complex process that is regulated by the action of global, regional, and local physical, chemical, meteorological, biological, and marine agents (Ruiz et al., 2005). I argue that the understanding of this phenomenon as part of a natural variability, that results from cyclical erosive/accretive coastal processes that are never in equilibrium, fundamentally challenge government narratives that highlight its causal dimension as well as its exceptionality. I elaborate on this idea in my final section.

4.4.2 Causes

Scientific experts emphasize that coastal erosion is the result of both natural and human-induced factors that operate on different scales (Doody et al., 2004). Erosion appears when cumulative natural or human processes interfere with the

supply capacity of sediment sources and with sediment transport processes on beaches (Anthony, 2005; Doody et al., 2004). These processes disturb beach sediment budgets and the morphodynamic functioning of beaches (Anthony, 2005).

Among the natural factors causing erosion are storms, altered wind patterns, higher waves, ocean and near-shore currents, vertical land movement, sea-level changes, wave climate, and surge levels (Nicholls et al., 2007; van Rijn, 2011; Doody et al., 2004). Coastal changes induced by the El Niño-Southern Oscillation phenomenon also promote beach erosion (Nicholls et al., 2007). Non-human biological agents may also promote erosion. Neumann (1966, p. 92) explains that rock-destroying organisms play an important role in the erosion of coastlines; this process is called bioerosion. Scientists explain that physical and morphologic factors such as the type and durability of rock, coastal morphology, coastal subsidence, sediment composition, and beach slope may determine erosion as well (Doody et al., 2004).

Anthropogenic pressures that directly affect the delivery of sediments to the coasts include the damming, channelization, and diversions of coastal waterways. Scientists also explain that there are other types of infrastructure that have reduced the availability of sand and altered natural sediment transport pathways. These include the construction of ports, the installation of pipelines, or the building of harbours and sidewalks along the coast (Alejo & Vila-Concejo, 2005; Fernández, González, Martínez, & Sánchez-Lizaso, 2005; Carranza, Marin, & Rosales, 2010). Land subsidence induced by the extraction of ground

water, gas and oil, land claims, dredging, sand mining, mangrove deforestation and diverse engineering works, are also among the identified human-induced factors that cause coastal erosion. Finally, sea-level rise as a result of global warming is also considered a major threat. In the following section I will focus my analysis on sea-level rise, as it has been described as a factor inducing erosion worldwide.

Sea Level Rise and Coastal Erosion

Scholars that analyze sea-level rise effects on coastal erosion recognize that there is a lack of knowledge and certainty on the complexity of both coastal systems and climate change. Experts on coastal erosion emphasize that “there is no single, simple explanation for the onset of beach erosion” (Bird, 1987, p. 154). Bruun proposed the first model to explain and estimate the erosion of sandy beaches in response to rising sea level; this model suggests that if sea level rises, the beach profile will achieve equilibrium with the new sea level by shifting landward and upward (Zhang et al., 2004). Bruun explains that a rise in sea level will be followed by erosion of the upper shoreface; and the movement of material eroded from the upper beach would be equal in volume to the material deposited on the near offshore bottom (Bruun, 2008, p. 631). A rise of the near off-shore bottom as a result of the eroded upper beach, equal to the rise in sea level, would thus maintain a constant water depth in that area (Bruun, 2008, p. 631). Titus explains that erosion “occurs because the swell that pushes sand from the bottom back onto the visible part of the beach can only reach so far below the

surface. If the surface is 1 cm higher, the elevation down to which that swell can reach is also 1 cm higher. Hence, less sand is carried back onto the beach” (Titus, 2005, p. 839). The Bruun rule suggests that shoreline recession is in the range of 50 to 200 times the rise in relative sea level (Zhang et al., 2004; Stive 2004). However, for many scholars this model remains controversial (Bruun, 1988; Zhang et al., 2004; Stive, 2004) which highlights the complexities of explaining coastal systems dynamics as well as of understanding how sea level rise is impacting coasts.

The IPCC’s fourth assessment reported that throughout the 20th century, global sea levels rose at a rate of about 1.7 mm/yr (Bindoff et al., 2007, p. 409). Updated estimates of sea-level rise indicate acceleration to 3.2 mm/yr since the 1990s (Meyssignac and Cazenave, 2012, p. 96). Church et al. (2011) explain that between 1972 and 2008, the largest contributors to sea-level rise were ocean thermal expansion and the melting of glaciers and ice caps. Projected sea-level rise at the end of the 21st century ranges from 18 to 59 cm (Nicholls et al., 2007, p. 13).

Sea level rise is not the main driver in promoting coastal erosion

Even after considering the sea level rates mentioned above, the IPCC’s Fourth Report emphasizes that “sea-level rise is not necessarily the primary driver” in promoting erosion (Nicholls et al., 2007, p. 318). In the Report, scientists explain that due to the coasts’ natural variability, it is “difficult to identify the impacts of climate change” on coastal erosion (Nicholls et al., 2007, p. 318). However they

highlight that sea-level rise “will exacerbate” beach erosion (Nicholls et al., 2007, p. 324). The Report states that even though “few studies have unambiguously” quantified the relationships between coastal land loss and sea-level rise, it emphasizes the challenge of determining whether coastal changes have resulted from climate change, from short-term disturbances (such as changes in the behavior or frequency of storms), or from human drivers like shore protection infrastructure (Nicholls et al., 2007, p. 318-320).

Studies of coastal erosion promoted by the European Union state that climate change is one of four major concerns for the next fifty years; they explain that sea-level rise is one of the most important drivers of accelerated erosion, and that climate change “will probably lead to an increase in coastal erosion” (Marchand, 2010; Doody et al., 2004). However, experts also recognize that “several recent studies indicate that coastal protection strategies and changes in the behaviour or frequency of storms may be more important than the projected acceleration of sea-level rise in determining future coastal erosion rates” (Marchand, 2010, p. 9).

Other scientists make remarks about the uncertainty of attributing coastal erosion to sea-level rise. For example, Stive (2004) states that even though sea-level rise has been regarded as the most probable cause of increased erosion, there are many coastal systems that have been accretive in the Holocene even though sea level was rising. Thus, he states, it is important to consider other processes and whether they have been impacted by accelerated sea-level rise. Thieler and Hammer-Klose (2001) suggest that in order to assess coastal

vulnerability to future sea-level change, it is important to combine the historical record of sea-level change with other variables, such as elevation, geomorphology, and wave characteristics. In their report on coastal vulnerability to sea level rise along the U.S. Gulf of Mexico Coasts— in which they considered geomorphology, coastal slope, relative sea-level change, shoreline change, and mean tide range and wave height – they conclude that 42% of the coast was considered to be at a very high risk (Thieler and Hammer-Klose, 2001). They report that geomorphology and tidal range most strongly influence the vulnerability ranking.

In terms of sea-level rise impacts, experts clarify the need to distinguish worldwide (eustatic) sea level rise from relative sea level rise, which includes land subsidence (Titus, 2005; Nicholls et al., 2007). They explain that it is relative (local) sea-level change that is driving local impacts. Local sea level may be determined by atmospheric pressure, changes in ocean circulation, local coastal winds, local currents, and rainfall (Komar & Enfield, 1987; Bindoff et al., 2007). Oceanic level change and geological uplift/subsidence are also factors that can determine regional variations (Nicholls et al., 2007). Experts state that in some regions, sea level rise rates are several times the global mean, while in other regions sea level is actually falling (Bindoff et al., 2007; Meyssignac & Cazenave, 2012). Scientists explain that to assess the full range of possible changes and impacts, it is essential to understand regional variability, its evolution in time and space, and its drivers (Meyssignac & Cazenave, 2012). They state that “analysis

should explore additional sea-level rise scenarios of +50% the amount of global mean rise plus uplift/subsidence” (Nicholls et al., 2007, p. 324).

In addition to this spatial dimension, there is another temporal dimension that is important to consider in analyzing sea level changes. Komar & Enfield, (1987), for example, argue that it is important to consider short-term sea level changes as a coastal erosion driver. They explain that seasonal cycles typically account for water-level rises on the order of 10 to 30 cm, sometimes up to 100 cm, exceeding the long-term rise that has been analyzed as an important factor causing coastal erosion (Komar & Enfield, 1987).

In sum, scientists’ accounts emphasize the understanding of erosion as a multifactor and complex process that is not mainly determined by sea level rise. These perspectives, I argue, offer a more comprehensive understanding of the interrelation between sea level rise and erosion than the ones offered in government narratives. These scientific explanations also put a clear emphasis on the uncertain nature of climate change impacts on coastal ecosystems, which in itself challenge deterministic and alarmist explanations of such impacts.

4.4.3 The Battle against the Sea

Another discussion in which scientists disagree with government narratives is about the type of solutions to deal with “the problem.” Scientists explain that the most common approach to erosion management worldwide has been the use of technical measures and hard shoreline protections (Doody, 2004; Storbjörk & Hedrén, 2011; Peynador & Méndez-Sánchez, 2010). Artificial structures that are

part of this “battle against the sea” (Doody, 2004) have been used for centuries in many coastal sites around the world. These artifacts of “hard” protection – seawalls constructed of stone, concrete, wood, steel, or geotextiles; rubble mound seawalls; quarry stone revetments; jetties; groynes; dikes; or artificial submerged reefs – have been the subject of much discussion among engineers and morphologists studying their impacts on coastal systems.

Scientists generally agree that although this type of shore protection aims to reduce damage caused by flooding, wave attack or erosion, they in fact have adverse effects by shifting erosion problems and other environmental problems to other nearby locations (Doody et al., 2004; van Rijn, 2011; Kraus, 2005; Correa et al., 2005; Titus, 2005; Ortiz et al., 2010). Since waves and currents transport sediment to the coast, shore protection projects promote shore accretion in one section of coastline and sand starvation in other sections. For example, van Rijn’s study (2011) shows that the implementation of groynes in Holland led to an increase in the variability of the local shoreline, “with maximum recession values much larger than the initial shoreline recession” (p. 885).

From an institutional management perspective, there are other disadvantages in approaching coastal erosion using this kind of technology: they require high capital investments and maintenance work, they have limited efficiency, their expected life is short, and they are only effective for a limited length of coast (Doody et al., 2004; van Rijn, 2011). Furthermore, Titus et al. (1991) explain that these structures are designed for current sea levels; therefore, if sea level rises, the infrastructure will be threatened (p. 179). In sum,

experts explain that these measures are remedial rather than preventive, since they tend to be implemented when destruction of property is impending, and overall there is a lack of planning and side effects are not considered (Lizárraga & Fischer, 1998).

In referring to the promotion of “hard” structures to prevent erosion, Doody (2004) explains that in the early 1990s, “notions that we should (or could) give up land to the sea were an anathema to many” (p. 135). However, recent studies of erosion in different parts of the world discuss alternative approaches. Integrated management systems and the use of “soft” structures – such as bioengineered protections or beach nourishment – are some alternative approaches that governments and scientists have proposed to arrest erosion.

“Coastal squeeze” is a term used by scholars to describe the narrowing of coastal zones due to the combined effects of erosion and infrastructural or other development that limit their natural adjustment to changes in sea level, storms, or tides (Doody et al., 2004; Doody, 2004). As García et al. (2005) state, the natural variability of coastal systems is “essentially incompatible with the static infrastructure developed by humans within the narrow strip of land that is exposed to coastal processes” (García, Ferreira, Matias, & Dias, 2005, p. 28).

In sum, scientists emphasize the need to first address structural problems that are causing erosion in the first place, such as lack of coastal planning when it comes to implement coastal urban, industrial or infrastructure projects (Alejo & Vila-Concejo, 2005; Doody et al., 2004; Marchand, 2010; Nicholls et al., 2007).

This also challenges some of the more technical adaptation measures proposed in government narratives to address the problem of erosion in Tabasco.

4.4.4. Coastal Erosion in the Study Case

In order to generally illustrate coastal erosion rates I present data considering various variables: 1) spatial: I present data on both, in Tabasco and the neighbor province of Campeche and also I mention specific rates in some of the study communities; 2) temporal: I present data from different periods: 1943-1972; 1972-1977; 1972- 1984; 1984-1995; 1995-2008, and; 3) severity: I show average rates, but also extreme values.

Studies conducted on the coasts of the Mexican province of Tabasco in the Gulf of Mexico have shown severe land loss rates and the prevalence of shoreline recession since 1943 – the year since data records are available (Ortiz, 1992; Ortiz et al., 2010; Hernández et al., 2008). Erosion rates are alarming in the communities included in this case study and in the region surrounding it. Ortiz (1992) explains that since 1969 several studies have analyzed the specific geographic characteristics of the Tabasco plains, highlighting their sediment and erosion problems. Ortiz (1992) analyzes coastal erosion along the delta zone between the provinces of Tabasco and Campeche. He explains that between 1943 and 1972 some areas retreated 15m, and during the period 1972-1977 some sectors retreated by 20m (Ortiz, 1992, p. 11-12).

Hernández et al. (2008) explain that during the periods of 1943-1958 and 1972-1984, coastal areas of the province of Tabasco and its neighboring

province of Campeche had an annual shoreline retreat rate of -8m/year. In their study, Hernández et al. (2008) conclude that this retreat trend continued during the period 1984-1995, with values between -9 and -10m/year, and with extreme values of up to -21 m/year in some areas. During this same period, one of the five communities included in my study experienced a shoreline retreat of about – 11.5 meters/year. Comparing erosion rates from the years 1995 and 2003, scientists found that two of the communities in this case study experienced extreme retreat values of up to -60 and -87 meters.

Ortiz et al.'s (2010) study of erosion rates from 1995-2008 in Tabasco shows that 59 percent of the province's total coastline – 209 km – experienced some degree of erosion during this period. In this study, erosion along the coasts of four of my study communities, about 28.4km, showed that the annual rate of coastal recession was -1.37 meters/year (Ortiz et al., 2010, p. 317). The study also showed extreme coastal retreat at higher values in some areas close to my case study area, with a retreat rate of -6 m/year.

In analyzing the causes of coastal erosion, it is important to highlight the different hypotheses that scientists have elaborated over the time, and to notice how it is only recently that sea level rise has been incorporated in these discussions. Experts agree that there are many, complex causes explaining the emergence of erosion, however, they clearly state that in Tabasco's coasts, the main driver of coastal erosion is land subsidence due to sediment compression and oil and gas extraction (Ortiz, 1992; Hernández et al., 2008; Ortiz & Méndez, 1999). Ortiz (1992) also emphasizes delta plain subsidence as a primary factor

driving the rapid deterioration of the Tabasco-Campeche deltaic coastal zone. Ortiz (2010) explains that there is an analogy between subsidence and sea level rise impacts, because subsidence promotes beach erosion and shoreline retreat. After analyzing historical data records and changes in beach ridge profiles over time, scientists conclude that processes of erosion and accretion have always co-existed in the Tabasco delta plain (Ortiz et al., 2010).

In his 1992 publication, Ortiz (1992) hypothesized about the causes promoting patterns of erosion and accretion in Tabasco's coasts during different periods between 1943 and 1992. He considered several factors to explain the diminishing of erosion rates in some areas during certain periods, suggesting that decreased storm and hurricane events during the 1970s and 1980s might explain this phenomenon. This analysis was based on the fact that certain processes, such as storm waves and surges and storm-induced currents, have an erosional impact on beaches. Furthermore, he hypothesized that the building of a road during the 1970s was probably another factor that could have diminished the rate and speed of erosion in some areas since it functioned as a wall or barrier. Altered wave conditions were also another factor considered in his analysis.

In 2008, Hernández et al. concluded that the predominance of erosive over accretive processes in the Tabasco coasts was similar to processes found in other coasts in the Gulf of Mexico and the Caribbean Sea (Hernández et al., 2008). From their perspective, their findings constituted new evidence regarding global mean sea level rise reported by experts worldwide. However, in order to really evaluate sea level rise impacts in the region, they pointed out the need to

produce spatial analysis and modeling studies focused on the particularities of Tabasco morphology. In their analysis, they included a section on sea-level rise predictions in order to draw attention to future implications for Mexican coasts. Other experts state that the specific topographic characteristics of the Tabasco delta, represented by plains and low plateaus, make its coasts especially vulnerable to sea level changes. Therefore, even minor sea level rises will affect vast continental regions of the Gulf of Mexico (Torres et al., 2010), with special intensity in the Tabasco plains.

In their 2010 publication, Ortiz et al. clearly concluded that sea level rise due to global warming is one “accessory or complementary factor” in explaining coastal erosion in Tabasco (p. 322). In interviews, scientists highlighted some of the problems they face in understanding climate change impacts at different temporal and spatial scales across the country. They mentioned the lack of data necessary to be able to create models and more accurate predictions. In addition, the lack of technology and human resources are other important factors preventing a more comprehensive analysis of climate change at a regional level.

Studies on coastal erosion in Mexico also highlight the lack of planning and the negative effects that urban developments and engineering works have had on Mexican coasts. Lizárraga and Fischer (1998) clearly state that Mexico does not have a policy to manage shoreline erosion. Peynador & Méndez-Sánchez (2010) explain that in Mexico, coastal erosion has been addressed through an erosion rate control approach, by implementing remedial measures through the construction of protective hard structures, land reclamation, and

beach nourishment. In the case of Ensenada, on the Mexican Pacific coast, this approach takes the form of isolated actions funded by owners on their own properties, without coordination with authorities (Peynador & Méndez-Sánchez, 2010, p. 352). Lizárraga and Fischer (1998) state that Mexican laws "are silent" on coastal erosion issues (p. 1231). They remark that from a government perspective, erosion is viewed "as a natural threat" to human occupancy of the shoreline, sidestepping important political, social, and economic processes that have induced erosion along these coasts (Lizárraga and Fischer, 1998).

In the context of Mexico's Caribbean coasts, experts explain that tourist infrastructure has had more negative impacts on coastal ecosystems and morphology than any long-term geologic process or natural event. Studies of coastal erosion in Cancun have demonstrated the impacts of infrastructure in promoting permanent erosion, as urban projects have obstructed natural sediment flows between lagoon and littoral systems (Ruiz et al., 2010). More specifically, in Tabasco, scientists emphasize that the creation of artificial openings along the coast and the building of breakwaters, jetties, and deepwater ports have all induced erosion (Ortiz et al., 2010; Hernández et al., 2008). However, in recognizing the lack of understanding of factors that could have influenced the emergence of accretive processes in some areas, scientists hypothesize that coastal wall protections might have prevented higher erosion rates (Ortiz, 2010).

4.5 Discussion

Esteves and Finkl (1998) make an interesting remark in analyzing coastal erosion along the Florida coasts. They explain that coastal erosion has been widely discussed by different actors – governments, scientists, and local inhabitants – however, they argue, “controversies arise regarding the perception and exact definition of beach erosion, mainly due to the diverse interests of the different parts in the subject” (Esteves & Finkl, 1998, p. 11). As analyzed in this paper, in the Mexican case the existence of different narratives of coastal erosion make evident the existence of multiple controversies about the nature of this phenomenon, as well as its causes and solutions.

One of the most important issues is that of the emergence and causes of coastal erosion. Mexican geologists have recorded the existence of coastal erosion along the Tabasco coasts since the 1940s. Based on historical data analysis, these scientists have concluded that land subsidence is the main driver promoting erosion. Since scientists have documented the existence of erosion since over 70 years, a key question emerges over the role of sea level rise in further inducing coastal erosion in Tabasco.

As I have discussed in this chapter, scientists have clearly stated that sea level rise is not necessarily the primary driver of coastal erosion in Tabasco, and they point to the need to consider the diversity of regional factors in inducing it. Coastal erosion is defined as a complex process that is locally specific. Experts explain that it is relative (local) sea level change that drives local impacts, and that this relative change is determined by different regional factors such as land

subsidence/uplift, atmospheric pressure, ocean circulation, local winds, currents, and rainfall. In sum, as Thieler and Hammar-Klose (2001) explain, “one of the most important applied problems in coastal geology today is determining the physical response of the coastline to sea level rise” (p. 1). Furthermore, scientists have also stated that coastal protection infrastructure and increased storminess may be more important than projected sea level rise in inducing coastal changes (Marchand, 2010).

My case study shows that despite the existence of different scientific and local environmental knowledge’s explanations of coastal erosion – from geologists and other coastal ecosystems’ scholars and fishers – Mexican governments are privileging global climate change frameworks to explain local environmental changes. The Mexican case demonstrates how government narratives explain erosion as a phenomenon that coastal areas are or are going to experience as a result of climate change – according to future predictions and scenarios. The privileging of certain frameworks points to core issues highlighted by S&TS studies, such as: What type of science and knowledge counts in problem definition? What factors are determining the type of science and scientists governments use in framing problems? Why are some frameworks used to mobilize human and financial resources while others are limited to the realm of scholarly debates?

In defining regional coastal erosion as a result of global sea level change due to the melting of glaciers and thermal expansion, the Mexican government is bounding and characterizing the problem within particular temporal and spatial

dimensions – bringing the politics of scale into the discussion through the framing of global problems. I argue that climate change frameworks allow the Mexican government to exclude contentious historical, political, economic, and environmental processes that influence environmental changes in coastal communities from their diagnosis. In adopting a narrative that emphasizes the “global” dimension of the problem and the “urgency” in attending its “inevitable” impacts, Mexican governments are excluding from their initiatives concrete and contextual governance failures – such as policy implementation, corruption, lack of planning, or land speculation – that are at the core of some environmental changes. In this case study, the discourse that explains the need to address climate change impacts in coastal communities does not discuss or address key contextual issues such as the role of infrastructure built by the oil industry or the development of urban projects, or other land-use changes that drive environmental change.

As Li (1997) explains, in the process of “rendering technical” contentious political issues, government discourses “are devoid of reference to questions they cannot address, or that might cast doubt upon the completeness of their diagnoses or the feasibility of their solutions” (p. 11). In criticizing the climate change narrative in the context of coastal areas, Mexican scholars such as Ruiz et al. (2010) clearly state that there is a need to “demystify” the idea that every coastal change is the result of climate change. These scientists emphasize the need for the government to focus on more “immediate” and important problems and needs before it commits to design initiatives that attend to impacts over the

long term. In criticizing governments' failures in addressing the root causes of climate change vulnerability, Gaillard argues that "national authorities further find in climate change a perfect scapegoat for the occurrence of disasters and the inhabitation of development" (Gaillard, 2010, p. 224).

The purpose of this chapter is not to deny the existence of climate change, nor to disagree on the importance of addressing its impacts on coastal communities. Instead, it highlights the need to critically analyze how certain narratives of environmental change frame problems, and the implications for local inhabitants experiencing those changes. Critical literature on climate change has discussed the implications of climate change narratives in terms of equity and human rights, and how in the process of redefining problems and identities under the climate change lens, local inhabitants' perspectives and voices are being "misrepresented or silenced" (Bravo, 2009, p. 268). As I discuss in the next chapter, the Mexican case shows how this process of reframing affects not only social identities but also contentious social relations. Government narratives, for example, call for a reconfiguration of fishermen's relationships with the oil industry, from confrontation to partnership and cooperation, so that adaptation goals can be achieved. As I discuss further, these are some of the "unintended" effects (Ferguson, 1994) of climate change narratives that should be critically analyzed.

Forsyth argues that "orthodox" environmental change narratives "fail to incorporate local people's experiences on environmental changes" as they have experienced them across the time (Forsyth, 2003, p. 24). This idea is clearly

illustrated in my case study, since it shows how local socio-political processes and fishers' environmental knowledge have shaped fishers' perceptions and understandings about environmental changes such as coastal erosion. In this chapter I have argued that fishers and scientist's explanations challenge government narratives in three important respects: (i) in relation to problem definition, questioning whether erosion represents "a problem" for local inhabitants in the first place; (ii) about the identification of the main drivers in the emergence of local changes, and; (iii) regarding the attribution of responsibilities to solve local problems.

Government narratives highlight coastal erosion as one of many climate change impacts. However, scientists and fishers question the very definition of erosion as "a problem" in itself. Scientists and fishers agree that coastal erosion is both, a natural phenomenon in the sense that it is part of a natural coastal variability but also they both argue that it is a "man-made" problem.

For fishers, erosion is part of the life of their communities; they recall their ancestors' testimonies about different shoreline variations that their coasts have experienced over time. These ideas also shape fishers' perceptions of environmental risks. For some fishers, erosion is not dangerous; they have always lived with it. As one fishers said: "maybe we are going to move from our places when we have the water up to our knees." These statements and perceptions may have important policy implications in terms of the solutions to coastal erosion included in Mexican climate change initiatives, such as the relocation of people living in at risk areas. In interviews, fishers explained their

concerns about relocation, including both economic and identity issues, which government officials many times fail to consider when designing their initiatives. As one activist clearly states, “some of us might think climate change is just about moving people to a safer place. But it’s about equity, identity and human rights” (quoted in Farbotko & Lazrus, 2012, p. 383).

Scientists and fishers also point out that coastal erosion becomes a problem only when there is not enough room to accommodate ecosystems’ changes. This alludes directly to development issues, such as the building of urban infrastructure or the lack of planning that fails to consider natural ecosystem processes or actively obstructs them.

The second idea that fundamentally challenges government narratives is that for fishers, coastal erosion is not a “natural threat,” as it has been framed by the Mexican government, in Tabasco and other coastal areas (Lizárraga & Fischer, 1998, p. 1240). Fishermen clearly stated that this is also a “man-made” problem that emerged as a result of infrastructure built by the oil company. Coastal erosion is perceived not as a consequence of changes in the environment, but as an effect promoted by engineering works that altered ocean currents, resulting in the promotion of erosion in their coasts. As I discussed, scientists studying coastal erosion have also greatly emphasized the role of infrastructure and urban developments as factors in inducing coastal erosion. This case study clearly illustrates Gaillard’s analysis of climate change narratives, in which he explains that “the contemporary focus on climate change thus reinforces a paradigm where Nature is the danger source (even if

exacerbated by human activity, as with climate change and other hazards) and where people have to adjust / adapt to that threat” (Gaillard, 2010, p. 224).

In analyzing environmental narratives in Oaxaca, Mexico, Mathews explains that “the texture of state society relations profoundly affects the status of knowledge, the legitimacy of the state, and the credibility of official knowledge claims” (Matthews, 2009, p. 89). In this case study, I argue that fishermen’s perspectives on coastal erosion are shaped by their long-standing conflict with Pemex, which has had catastrophic social, economic, and environmental impacts on the region. It is in the context of their conflict-ridden relationship with the government that local fishermen have developed their understanding that the causes of many of their problems are due to decisions by the Mexican government – through the oil industry - as opposed to problems caused by nature or climate change. Fishermen’s positions also make evident that people’s vulnerability to climate change impacts are the product not only of climatic events, but “from conditions and systemic power relations on the ground” (Farbotko & Lazrus, 2012, p. 382).

The third idea challenging government narratives is in the attribution of responsibility for dealing with coastal erosion impacts. In a report on coastal erosion commissioned by the European Union, scientists remark that “hardly ever are parties responsible for coastal erosion made accountable for the consequences” (Marchand, 2010, p. 9). This is one of local fishers’ claims as well, when they explain that the government is responsible for solving or preventing coastal erosion. In contrast, government narratives highlight the

“common” responsibility that individuals, governments, and other actors should assume in facing climate change impacts. For government representatives, fishermen “must adapt” to climate change by modifying their practices, and the list of specific recommendations is long: they should shift to farm fishing, build their homes as their ancestors did, or relocate away from risky locations to safer places. In sum, they should adopt many of the so-called “sustainable” practices that these government narratives describe.

In sum, my analysis of different explanations of environmental changes, and the controversies surrounding these issues, illustrates that efforts to position climate change at the core of global politics is a very contested process on the ground. Analysis of fishers and scientists’ explanations of coastal changes clearly illustrate the de-politicized nature of government narratives, which are ignoring contentious political, economic and environmental issues. The discussion of such a variety of narratives also demonstrates how fishers’ perceptions of environmental changes are not detached from the political economic context forged in this region over time. Finally, this chapter also discussed issues pointed out by S&TS studies, regarding problem definition (when erosion is a natural process, or when it is a social problem), and the type of knowledge government narratives use (or sidestep) to explain the problem.

CHAPTER 5. THE PROMISES OF CLIMATE CHANGE ADAPTATION IN COASTAL COMMUNITIES

5.1 Introduction

In this chapter I analyze government climate change adaptation narratives in Tabasco. I discuss them in light of fieldwork findings, particularly in relation to local struggles that represent a challenge for government officials seeking to implement climate change adaptation measures in the region. Mosse explains that government initiatives “may not generate events, but [they help to] stabilize the interpretation of events” (Mosse, 2004, p. 655); they “work to maintain themselves as coherent policy ideas, as systems of representations” (Mosse, 2004, p. 654). In this chapter, I analyze how the Mexican government’s climate change narratives stabilize and maintain coherent interpretations of events under a structured set of ideas and frameworks that highlight some aspects of events rather than others, or that exclude certain events and actors and include others.

I argue that government narratives attempt to reconfigure social, political, and economic relations in the region – e.g. by attempting to make fishermen and the state-owned oil industry into allies against climate change impacts. These government narratives propose forms of “adaptive” action that I argue replicate and reinforce problems historically associated with critiques of “development.” Finally, according to these narratives, adaptation measures must be implemented alongside other strategies that aim at shaping an “adaptive subject” (McNamara, 2006; Felli & Castree, 2012). Fishers should modify their behavior, practices and social relations so they can face climate change impacts.

These government narratives are based on the IPCC model. This is a scenario-driven approach that evaluates the impacts of climate change and assesses potential adaptation and mitigation measures aimed at reducing climate change vulnerabilities, an approach that “echoes particular models of explanation and causality” (Beck, 2011, p. 299). In this framework, Beck argues, adaptation “refers only to actions taken in response to climatic changes attributed to green-house gas emissions” (Beck, 2011, p. 302). In the case of Tabasco, this analysis focuses on two climatic impacts: floods and sea-level rise. Although the government narratives discuss climatic and non-climatic causes in the construction of coastal communities’ vulnerabilities, the purpose of these government interventions is to propose adaptation measures that aim to deal with climate impacts. The “field of view” determined by this narrative therefore leaves aside the set of policies and initiatives that would address structural factors that determine coastal communities’ vulnerabilities in the first place. And in doing so, they “render technical” contentious political issues.

Ferguson argues that development apparatuses work as an anti-politics machine, which in the case of Lesotho represented a process of depoliticization in which history and politics were swept aside, and state initiatives were represented as neutral and technical (Ferguson, 1994). Using this framework to analyze the case of Tabasco is of particular importance, since it is a context in which resource access and management is a very contentious issue, involving conflicts between powerful actors – including the state-owned oil company – and fishermen. The government’s climate change initiatives are presented as

“neutral,” since they are based on science, which is itself conceived as a neutral force whose only aim is to provide “truth to power.” However, since such interventions aim to assess, diagnose, and propose adaptation measures, they necessarily involve extremely sensitive political issues, such as resource control and access, among others. As I discuss in this chapter, this representation of adaptation measures as “neutral“ could never be seen as such by local fishermen if these measures propose specific ways to manage, limit or access local resource, or even if they just involve new ways of reinterpreting contentious historical issues.

As I discuss in this chapter, Roe’s illustration of development narratives closely resembles the climate change narratives of the Mexican State. He explains that development planning:

“employs a narrative structure comparable to the archetypal folktale. A problem (often a “crisis”) is encountered: it will be ‘solved’ through the epic endeavour of a hero (the project/policy), who faces and overcomes a series of trials (constraints), and then lives happily ever after” (quoted in Gasper & Apthorpe, 1996, p. 9).

However, my analysis of the Tabasco case also shows that the recognition of complex and structural problems within the folktale does not necessarily address or change an initiatives’ final aims. Within these narratives, the discussion of social, economic, and historical conditions is instrumental in justifying the “complexity” of the climate change problem; however, as I demonstrate in this chapter, even though these factors are contained within government narratives, they are not actually addressed.

These climate change narratives are presented as a manifestation of the collective efforts that are needed to face climate impacts, to reduce the population's vulnerabilities, to promote sustainable development, and, in sum, as "a force for beneficial change" (Ferguson, 1994, p. 10). Quarles, Kumar, and Mosse (2003) argue that international development is entering a new phase of "high managerialism" – the reverse of high modernism – stating that:

Today's narrowly defined development ends and broadly defined means precisely contrast the modernization models of the 1950s and 1960s in which broadly defined and radically future-oriented development ends – the transition to modernity – were to be accomplished through narrowly defined means, namely technology-led growth (roads, seeds or architecture) (p.7).

As I discuss in this chapter, the Mexican government's climate change narratives show signs of both of the two processes described above, which the authors describe as separate. On one hand they are strongly future-oriented, since the very nature of the issues they deal with have long temporal scales, but also because they are oriented towards the realization of a sustainable world. On the other hand, climate change initiatives also include broadly defined means, which are labeled under big and poorly-defined policy fields such as adaptation measures which include fishing planning, implementation of better water management practices, and the improvement of agriculture. Other means are, in contrast, more narrowly defined. Some scholars criticize them as technocratic and managerial, examples include improved climate-resistance seeds or climate-proof infrastructure.

In the next section I analyze how climate change adaptation narratives attempt to reconcile opposed interests between local fishers and the oil industry, a sector that according to fishers and scientists has been the main factor causing people's vulnerabilities in the study region. The third section focuses on the many promises of adaptation, and analyses specific measures proposed for Tabasco's coastal communities in light of local fishermen's views. The last section discusses two examples that illustrate government narratives' efforts in the making of an adaptive subject, which are aimed at shaping fishers' conduct.

5.2 Discursive Reconciliations between Fishermen and the Oil Industry

In this section I discuss how federal and provincial government narratives recognize the existence of non-climate change factors determining the vulnerability of coastal communities. These narratives do not attribute responsibility to the oil industry as one of the many sources of local vulnerability. Instead, government narratives work to discursively reconcile the oil industry and the fishermen by presenting both as victims of climate change impacts.

The history of Tabasco – marked by development interventions that led to profound social and environmental structural transformations – has represented for local inhabitants a history of the construction of their own vulnerability. Despite these historical facts, government narratives of climate change appear to reconcile what history has shown to be an irreconcilable set of interests and projects. Government climate change interventions, according to these narratives, look for solutions for a broad array of actors and sectors, including the

oil and tourist industries on the one hand, and the abstract aggregate of “coastal populations” on the other, as well as claiming to take into account the different ecosystems they inhabit.

As many scholars have argued, the accelerated growth of the oil and tourist industries in Mexico over the last few decades “has triggered social and environmental conflicts concerning land use, resource exploitation, and pollution” between state and private agencies and local communities (Delgado, et al., 2011, p. 1137).⁴⁸ The government’s climate change narratives both recognize these industries’ impacts on local inhabitants, and at the same time highlight the need to implement strategies to protect these industries from climate change impacts. Under this approach, the oil sector and fishermen are supposed to share the same concern: they are both victims of climate change impacts – for example, beach erosion that is destroying oil infrastructure as well as communities’ houses and roads – with a shared need to find a solution.

I argue that this work to reconcile the interests of fishermen and the oil industry is possible because these narratives focus on explaining vulnerability to climate impacts rather than addressing structural factors that put communities at risk in the first place. My analysis shows how government narratives transform the oil industry from being a historical cause of environmental change and source of local vulnerability, to a potential victim, therefore aligned with the fishermen who have historically been opposed to this industry.

⁴⁸ In Tabasco the tourist sector is marginal; this note refers to the most important touristic enclave in the country: Cancun and the Mayan Riviera region.

This is also the case with wetland ecosystems that according to government narratives need to be protected – through conservation programs or the creation of natural protected areas – so they can be better equipped to face climate change impacts. Instead of critically discussing the role of the oil industry in destroying coastal and marine ecosystems, what government narratives emphasize is the need to propose a set of actions – adaptation measures – to protect ecosystems from possible future climatic changes based on uncertain scenarios. The search for structural solutions to problems that the oil or tourist industries cause for fishermen’s livelihoods or environments, or for wetlands, are not considered part of the problem to be solved, although they are part of the storyline.

Government narratives do recognize the existence of “non-climate change” factors that have determined the magnitude of weather-related disasters to a great extent. Specifically, the Tabasco Climate Change Plan states that floods are “not the result of changes caused by ‘climate change’ but are due to various changes introduced by human beings, specifically by altering the natural hydraulic flows” (SERNAPAN, 2011, p. 94). The Plan states that there are two key non-climate related factors that are increasing flood impacts: deforestation, which reduces water filtration and increases sedimentation, and non-planned infrastructure building that obstructs natural hydrologic dynamics (SERNAPAN, 2011, p. 95). In addition, increasing urbanization and other land-use changes have also impacted the hydrodynamics of the region.

The oil industry has been a key actor in implementing efforts to contain, divert and manage water in Tabasco; it has built 80 km of channels and drains inside lagoons and rivers to facilitate the introduction of oil machinery (Bello et al., 2009, p. 488). The construction of roads and pipelines, as explained in the previous chapter, has destroyed coastal vegetation, induced beach erosion, and modified the natural draining streams of peasants' lands, which has resulted in the inundation of their territory or drought in other places. However, the Tabasco Climate Change Plan omits any mention of the role of Pemex in altering the natural hydrologic dynamic, or other impacts. It mentions the problems of infrastructure and land use change as a rationale to intervene, but without naming the actors that historically have driven such transformations.

In a study of climate change vulnerability in Tabasco, which provides data and analyses used in making the province's climate change plan, scientists explain that the magnitude of risks and the occurrence of disasters are directly related to the vulnerability of the population. Vulnerability is highly associated with poverty and the economic conditions of Tabasco's population; in this study, scientists refer to indicators such as population growth and lack of urban planning. They also highlight the lack of government support in rural areas, associating this factor with increasing migration flows to cities. This factor, they continue, contributes to increasing urban density and therefore, to the fact that more people are exposed to hydrometeorological risks (Gama 2008).

This analysis of the structural causes of vulnerability is again omitted from the Tabasco Climate Change Plan. Instead, the Plan primarily focuses its

analysis on predicted risks and the methodologies used to construct different scenarios. According to government protocols, studies and assessments are needed to understand the magnitude of climate change impacts, but more importantly, to design corresponding adaptation policies to face them. However, government officials discretionally select the information and rationale to be used in justifying government interventions, and in the process key actors and events are erased from the narratives.

An example of what I call discursive reconciliation of actors and interests is made in initiatives such as the Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico (hereafter the Wetlands Report). This initiative is promoted by agencies such as the Global Environmental Fund, the World Bank, and the government of Japan, who are lending or donating funds to Mexico to support climate change projects. In this study, the authors (scientists) clearly recognize the existence of a diversity of non-climate sources of vulnerability, stating that “[i]t is safe to say that pressure from human activities in these ecosystems is the main threat, to which we must add future changes in climatic conditions” (Buenfil, 2009, p. 26). This project highlights the fact that water pollution, stemming from untreated urban and industrial wastewater, agricultural runoff containing fertilizers and pesticides, and spills from oil extraction, transport, and refining, are some of the most important problems in the Gulf of Mexico region (Buenfil, 2009, p. 27). The study explains that the deforestation of forests including mangroves is occurring at alarming rates (Buenfil, 2009, p. 26). The main causes of this loss of vegetative cover are the

expansion of agricultural and livestock activities and the development of urban and industrial infrastructure – including that developed to accommodate tourism (Buenfil, 2009, p. 27-28).

Scientists who participated in the Wetland project recognize Pemex's environmental impacts in the region, and the study discusses the long-lasting transformations in the region induced by such "forced industrialization" and also includes other environmental transformations such as those Tabasco experienced due to the Plan Chontalpa (Bello et al., 2009, p. 489). Although the oil industry is considered the source of many of the region's problems, this study includes a discussion about the impacts of sea level rise on Pemex's coastal infrastructure. Pemex has built several different kinds of infrastructure to contain increasing erosion – particularly concrete and synthetic walls – but these have failed to prevent damages to the oil infrastructure. A newspaper reported that when Pemex started working in Centla – a neighboring coastal area – the water was far from where the company built its infrastructure, but after only two years the sea has advanced about 200 meters over the beach, causing severe damage to its facilities (Mari, 2012, p. 14). According to this source Pemex will begin to implement a fourth strategy to stop erosion: the building of artificial reefs (Mari, 2012, p. 14). Due to its situation, the Wetlands project emphasizes that the oil industry's infrastructure is one of most vulnerable to climate change and coastal erosion. As a result, they argue that "adaptation projects are essential to sustain the economic system [oil industry]" in the region (Bello et. al, 1999, p. 499). In this framing, the oil industry shifts from being one of the most important causes of

vulnerability in the region to a victim of climate change impacts. The discussion of the industry's role in contributing to climate change is also omitted.

The Wetlands project report includes some important clarifications that, to a certain extent, question the core argument and rationale with which climate change interventions are made. These clarifications are important to highlight, because they reveal a variety of different approaches that scholars participating in the making of a study have toward the issue of climate change. First, the study states that it is not clear whether the hydrometeorological events that have severely impacted the Gulf of Mexico coasts over the past few years are caused by climate change, or whether they are part of a natural process. The narratives in this project recognize that although the number and intensity of natural catastrophes have increased in the coasts of the Gulf of Mexico, “[w]e do not know with precision whether they are consequence of a natural evolution of the Earth and what percentage has been caused by climate change” (Graizbord & Gómez, 2009, p. 43). As I analyze in chapter six, this kind of uncertainty about climate change impacts is not preventing the mobilization of government resources and interventions.

The second important caveat noted in the Wetlands project is that “wetlands present low or moderate vulnerability to climate change, but [they] however experience different anthropological stresses such as deforestation, overfishing, tourism and pollution” (Buenfil, 2009, p. 53). Again, this statement intrinsically questions the centrality of climate change impacts in wetlands degradation, by highlighting the impacts human activities have had on these

ecosystems. This is similar to my finding discussed in chapter six: scientists interviewed in my study have commented critically on government narratives centered on climate-related impacts, particularly in contexts like Mexico, where many other development issues must be addressed to reduce the vulnerability of people to climatic changes.

5.3 The Promises of Adaptation

In this section I discuss the concept of adaptation in light of some critical approaches to climate change and development narratives. I also analyze some characteristics of the proposed adaptation measures for coastal communities, as they relate to local livelihoods and perspectives.

In government narratives, adaptation is explained as “an opportunity to change paradigms and to improve the quality of life” of people (CICC, 2012a, p. 147). Adaptation is framed as a key step towards the realization of sustainable development in Mexico (CICC, 2012a, p. 146). This echoes framings circulating among international aid development agencies that point out the need to mainstream adaptation into development projects, because it represents an opportunity to get development “right” – that is, to avoid the pitfalls of past failed development practices (Lemos, Boyd, Tompkins, Osbahr, & Liverman, 2007). Adaptation is also explained as an opportunity “to rethink or 'reimagine' what international development means and how it needs to change” (IDS, 2012). This teleological conception of climate change adaptation resembles past

interpretations of development models, something that can be seen strongly in the government narrative as well. Orlove (2009) explains that,

Much as the word development places all nations on a single scale, offering the suggestion that the very poorest nations of the world are developing and are moving towards the prosperity of the richer ones, so too the word adaptation places all outcomes on a single scale, offering the suggestion that the world can shift up from the less satisfactory outcomes to the better ones (p. 136).

A clear illustration of these framings can be found in the recently released National Climate Change Strategy (SEMARNAT, 2013), in which the Mexican government explains its strategy and targets to be achieved by implementing climate change strategies in development planning. This document explains that in 10 years, the goal is to attend to the most vulnerable groups; the Strategy also envisions an “involved and actively participant society” in climate change issues (SEMARNAT, 2013, p. 23). In 20 years, “society is committed to reducing climate change impacts, and human settlements would have strengthened their adaptive capacity” (SEMARNAT, 2013, p. 23). In 40 years, society “culturally and socially has become integrated into the climate change struggle,” and the rural population is “not very” vulnerable (SEMARNAT, 2013, p. 23).

Government climate change narratives state that the integration of adaptation objectives with development planning is a challenge since they need to address poverty and inequality, which implicitly “question[s] the development model” (CICC, 2012a, p. 82). The Tabasco Plan seconds these ideas by stating that climate change policies are an important step towards the reconsideration of

“human-environment relationships” (SERNAPAN, 2013, p. 9). For example, the Wetlands project states that adaptation is a process that “will lead to better resource management (water and land), conservation of ecological processes and biodiversity, more sustainable human activities, reduction in vulnerability to extreme weather events” (Buenfil, 2009, p. 30).

This discursive approach to adaptation however, is not translated from this theoretical framing to practice on the ground. Furthermore, as I discuss in the next chapter, adaptation measures in Mexico reflect a managerial approach that reinforces the idea that if we as a society “are prepared” then problems will be manageable (Orlove, 2009, p. 136). This statement can be analyzed through the many scholarly debates that criticize what has been described as the dominant technocratic approach to adaptation, which draws on physical, technological, economic, and managerial frameworks, values, and narratives to explain the problem of adaptation to climate change and its possible solutions (Heyd & Brooks, 2009; Nelson, West, & Finan, 2010; Smith, Burton, Klein, & Wandel, 2000; Leach et al., 2010).⁴⁹

Using this literature, we can identify two normative characteristics of this framing of adaptation. On one hand, adaptation has been portrayed as “something”⁵⁰ local communities must do if they want to overcome the impacts of climate change. On the other hand, as I discussed above, adaptation is included

⁴⁹ Scholars have also highlighted the regulatory character of the term adaptation, explaining that it is a concept that “has gone from being considered something done by plants and animals in evolution as a response to environmental changes, to being promoted as a concept for guiding policy to ensure sustainable development, reduce vulnerability and minimize risk to humans from climate change” (Shipper, 2007, p. 3).

⁵⁰ Scholars point out the need to clarify what exactly is being understood by adaptation and for whom: Is it a course of action? Is it a process? Is it a public policy? Is it a local action? I raised these same questions in interviews with scientists in Mexico.

in development jargon as something “good”⁵¹ that should happen in order for a community to improve, as an opportunity, or something advantageous for local communities. Finally, another set of critiques underscores the top-down origin of this concept,⁵² suggesting that the term adaptation “does not always capture the full impacts of climate change and ... does not always represent accurately either the perceptions of the people affected by these impacts or the range of alternatives open to them” (Orlove, 2009, p. 131). The implications of this statement are clearly illustrated in the discussion that follows in the next section.

Adaptation Measures

In this section, I discuss adaptation measures in light of fishermen’s views on particular problems that directly intersect with such initiatives. As this section shows, the “promises of adaptation” are challenged by situated local dynamics, which are determined by historical struggles over natural resource use and access. Adaptation initiatives in Tabasco articulate ideas about how coastal inhabitants should live and produce, but also about how they should transform their social relations in order to better face climate change impacts. But implementing such ideas on the ground is not an easy process. My fieldwork findings show the complexity of the transition between global and local scales,

⁵¹ As Nelson et al. criticize, in climate change discourses “adaptation is presented as a panacea, a kind of off-camera bodyguard that will opportunely step in to buffer populations from the advance of rising sea levels, species extinctions, temperature extremes, shrinking ice flows, and so forth” (Nelson et al., 2009, p. 271).

⁵² In discussing the omission of the long-term scholarly tradition of cultural anthropology on adaptation research, Nelson et al. emphasize that “the climate-change debates have historically focused on technologies and the elusive search for large-scale, cookie-cutter solutions, leaving aside the important role that individuals, cultures, and societies play in constructing and living out an adaptation dynamic” (Nelson et.al., 2009, p. 272).

from global models to the practices, events, and material outcomes they are expected to generate. As ethnographic and actor-oriented development scholars have highlighted, interventions should be understood as socially constructed processes that are continuously negotiated on the ground by a wide array of local actors with their own interests and perspectives. As Long (1990) explains,

Although it may be true that certain important structural changes result from the impact of outside forces (due to encroachment by the market or the state), it is theoretically unsatisfactory to base one's analysis on the concept of external determination. All forms of external intervention necessarily enter the existing life-worlds of the individuals and social groups affected, and in this way are mediated and transformed by these same actors and structures (p. 6).

However, how we understand “the internal” or “the local” is also very relevant. As development scholars have highlighted, there is a need to demystify the existence of a clearly defined unit called “the community” or “the local.” In this dissertation, local communities are understood as heterogeneous entities, far from being closed and united. As I discussed in the previous chapter, fishermen’s perceptions of their social context – their community problems or environmental changes – are mediated by political, economic and environmental factors that determine fishermen’s natural resource access and control. In this study I analyze the perceptions of different fishermen – cooperative members, private fishers and freelance fishermen – who by definition have differential access to natural resources from the sea and inland lagoons, to local institutions regulating access, and to state agencies providing fishing funding and support. The “local,”

then, is a socially, economically, and culturally stratified social space in which global interventions land and take different shapes. Such state or non-state “external” initiatives then are perceived and negotiated differently by various actors who put forward their own agendas as well.

The Projects

There are two key characteristics of adaptation projects. The first is that they try to solve what I identify as old development problems and second, that they underscore the importance of social participation. In the past, these kind of initiatives occurred under other labels, such as sustainable development. Many of these adaptation measures have also long existed as part of national policies,⁵³ again only re-labeled under a new name: climate change adaptation. For example, the Climate Change Plan in Tabasco lists adaptation projects like: a) water conservation and management; infrastructure planning based on the natural characteristics of the territory and water dynamics; coastal aquifer conservation; b) forest management – reforestation, land-use change from livestock to forest, clean energy production, urban forest conservation; or c) sustainable productive projects that aim at protecting native species.

In the promoters’ view – World Bank officials, NGOs, government officials, scientists – the success of adaptation initiatives “depends on the degree to which

⁵³ Scientists working on the Wetlands project emphasize that the Mexican government already has the institutional capacity to implement adaptation measures through mechanisms and institutions like ecological and territorial regulations. They state that Natural Protected Area management plans are mechanisms that “allow for greater control and monitoring of implemented [adaptation] measures” (Buenfil, 2009, p. 30). Watershed Councils are another example of the many mechanisms for public participation and implementation of adaptation initiatives. They encourage the effective implementation of these regulations and plans on the ground.

the community takes ownership in such actions” (Buenfil, 2009, p. 29). If they are embraced by local populations, if fishermen are “actively involved” then the initiatives will be successful (World Bank, 2008, p. 5). Therefore, it is through the “social participation” ingredient that local authorities, fishing cooperatives, farmer cooperatives, and local and regional NGOs members can take part in project design and implementation.

In what follows, I discuss some adaptation actions proposed for coastal communities, and the opinions fishermen expressed in interviews about some local issues. It is in light of this contextual setting in which adaptation projects are going to take place that one is able to critically analyze their viability, as well as the extent that these initiatives address structural factors on the ground:

1. Community Relocation. The relocation of settlements currently located in vulnerable areas (CICC, 2007), is an adaptation measure proposed in Mexican governments’ plans. These narratives recommended the relocation of infrastructure and populations that are less than 10m from rivers and lagoons (Gama, 2008, p. 73). Examining this type of adaptation option in places around the world, climate change researchers have highlighted that “relocation is an extremely complex process and often can only be achieved at considerable economic, environmental, emotional and social cost” (Campbell, Goldsmith, & Koshy, 2005, p. 5). Land tenure, land availability and infrastructure are among the many issues that need to be taken into account in elaborating this kind of initiative (Campbell, Goldsmith, & Koshy, 2005, p. 5).

In my study area, people have already been displaced from their land and homes. In some communities, fishers explained that people had moved to other places within the same communities but without government or community support. In one of the communities, the one most affected by erosion, fishermen commented that some government officials have mentioned the possibility of relocating their village. Erosion has destroyed the only road that connects the village to other places. When I asked the fishers about relocation, they expressed concerns, explaining: “the only occupation we have learnt since we were born has been fishing, what are we going to do in another place with no job waiting for us and without any other skill?”⁵⁴ The majority of these fishermen stated clearly that they would reject moving to another place; there are many concerns preventing them from moving, among which lack of jobs and means to make a living are the most important.

Fishers’ risk perception is also an important factor accounting for this rejection of relocation. In general, fishermen do not think the problem – coastal erosion, flooding – will get worse than it is now, so from their perspective they can manage to live as they are, with the water just beside their houses. They understand coastline changes as part of a natural dynamic. They explained that this condition is part of their life, and recall their ancestors’ accounts about different positions the shoreline has had over time, sometimes closer to their homes, sometimes farther away. As a result, the process of consultation and negotiation that needs to be carried out by government officials in considering

⁵⁴ Interview with a freelance fisher. June 7, 2012. Tabasco.

this adaptation option has to consider local perceptions of risks, and how people have historically managed to live with this type of environmental change.

Other studies have discussed how people's distrust of government-driven adaptation and relocation planning is an important factor accounting for local inhabitants' rejection of moving from their current location (Marino, 2012). As some scholars have discussed, "traditionally marginalized populations, whose very marginality contributes to vulnerability, will likely continue to be marginalized from adaptation decision-making and continue to distrust governance structures that are already in place" (Marino, 2012, p. 379). In my case study, local inhabitants are not participating in the decision-making process for the proposed climate change initiatives already taking place in Mexico. As I discussed in the previous chapter, fishermen's perception of initiatives such as relocation are strongly determined by their long-term struggle against the oil company (struggles over space and resources) as well as their relationship with fishing authorities (corruption).

2. Aquaculture. The implementation of aquaculture projects "to increase the supply, compensate the loss of fishing from climate change, and to promote the restocking of wild species" is another adaptation option (CICC, 2007, p. 118). The Tabasco Climate Change Plan proposes the implementation of fish farming as an option to promote fish auto-consumption and improve the production of native fish species. This option is considered an alternative food-production system to face the negative predicted climate change impacts on fishing, which

will affect production patterns “by shifting production as species move to new habitats or as a result of changes in the net marine primary production” (Merino et al., 2012, p. 795). Aquaculture is therefore a strategy to produce and stabilize fish supply.

In Mexico, the government promoted this type of economic alternative in the rural areas inland and in coastal areas during the 1980s (Delgado et al., 2011). The implementation of this type of adaptation measure therefore has a long history in these case study communities, even though they were not always framed as a response to climate change impacts. A fishing government officer explained that these projects were implemented by the government as a strategy for diversifying the economic opportunities of local people who lack official government permits to fish. In the study region and in neighboring communities in Tabasco, the first efforts to cultivate oyster began in 1976 with the support of the national and provincial governments.⁵⁵ Other types of aquaculture projects implemented in the area are shrimp (*Litopenaeus vanamei*) and tilapia (*Tilapia nilotica*).

According to one study (Delgado et al., 2011), Tabasco is the province with the least-favorable coastal conditions for the development of sustainable aquaculture activities in the country. Among the key indicators used in this study to determine this activity’s suitability were the presence of oil pollution – impacts

⁵⁵ Interview with a government official from the Ministry of the Environment (provincial office). December 21, 2011. Tabasco.

caused by oil spills and leaks that affect the land and water – and a lack of capacity to treat wastewater.⁵⁶

In the interviews with fishers, they discussed two main issues regarding aquaculture projects, drawing attention to the relevance of local politics, particularly corruption and struggles over space and resources. The first issue concerns social organization, corruption, and lack of government and fishermen accountability. A main concern was that, historically, it has been the same group of privileged fishermen – with political power – who have benefited from this kind of project: they know how to get the funding, they know “the rules of the game.” A second related concern was that government officials never follow up on projects’ implementation or effectiveness. In interviews, fishermen showed me several farming facilities that had been built but never used. Diversion of funds and lack of accountability were the main problems fishermen discussed in these interviews. From their perspective, the government is just wasting public resources. However, from a local fishing official’s perspective, aquaculture projects have been successful and are a way to diversify the local economy.

A second important comment related to this type of project in Tabasco was made by a local fisherman leader, who explained that this type of initiative is a strategy the government is using against fishermen. He said that “the government wants to throw us out of the sea so Pemex can make use of it, can

⁵⁶ It is also important to evaluate the promotion of this kind of initiative in light of studies that criticize the fact that this economic activity converts natural coastal defenses, such as mangroves, to aquaculture, and as a result can increase the vulnerability of coastal communities to sea level rise (Barnett & Campbell, 2010). However, these particular issues - lack of local conditions to produce farming species, mangrove destruction - were not raised as problems during interviews with fishermen or fishing authorities.

exploit it.”⁵⁷ As I argued in the previous chapter, struggles over space and resources have a long history in this province. Therefore an important dimension in considering the promotion of aquaculture in these communities is fishermen’s identity and the underlying power relations among fishermen’s groups and organizations. A fishermen’s leader stated: “we are fishermen, we are not fish farmers, but the government wants us to become farmers.”⁵⁸ The implementation of what in climate change narratives is explained as an “alternative” economic activity has different meanings for certain actors – adaptation projects may be considered a threat to fishers and their identities – which reflect the contentious struggle over the territory and its resources and is clearly exacerbated when projects of this type are implemented in these communities. Furthermore, in the context of these communities, the introduction of what could be read as an adaptation initiative is instead seen as a project to reconfigure actors and resources – both natural and financial – with direct implications for fishermen’s livelihoods and power. Fishermen’s identity is permeated by this struggle of actors and interests that historically have shaped social relations in Tabasco’s coastal communities. This case study clearly illustrates Gramsci’s idea that “struggles over meaning are every bit as ‘material’ and important as practical struggles” (Castree & Braun, 1998, p. 13).

Finally, along with these criticisms fishermen also complained about the lack of government support in terms of marketing and industrializing their production, or funding to acquire better equipment. They complained that the

⁵⁷ Interview with a local fishers’ leader. December 21, 2011. Tabasco.

⁵⁸ Interview with a local fishers’ leader. December 21, 2011. Tabasco.

fishing sector has been forgotten by the government, and that there is no clear strategy to drive this sector and make it competitive.

3. Fishery planning. In a social context of unemployment and economic crisis, resource overexploitation and degradation, local social conflicts, lack of state support, and reduced local access to fishing resources, adaptation measures such as fishery planning are a daunting task. Mexican government narratives specified two particular adaptation objectives in terms of fishery planning: to protect traditional fishing and to exploit alternative species in a sustainable way (CICC, 2007).

In interviews, the first concern fishermen raised was the lack of government support to find better strategies to market their catch. In addition, they discussed the need to learn new technologies and techniques to transform their fishery production. They visualized this strategy as the only one that will help them survive the many economic pressures they face, particularly lack of production and low prices. How this local concern fits into adaptation measures, such the one that aims to protect “traditional” fishing, is not clear. I infer that the purpose of this adaptation measure is closely related to the need to protect fishing resources by using techniques that are not designed for mass production. However, an important question remains unanswered in this approach: Is small-scale production something fishermen conceive of as advantageous for them? In interviews, they explained that their lack of motor boats and nets have prevented them from going farther distances to find the fish that in the past they were able

to find close to the coast. This was explained as something that put them at a disadvantage in relation to the group of fishermen – *permisionarios* – who have the financial and political resources to access this type of equipment.

The second adaptation measure, promoting the sustainable use of alternative species, also involves many challenges. An analysis of the underlying set of factors determining fishermen's decisions on when and what to fish would shed light on the viability of this kind of adaptation measure. The bottom line is again the need to consider fishermen's economic constraints, which to some extent are influencing their decision-making in terms of the type of species they exploit (markets, value, etc.). But most importantly, these decisions are also determined by technological constraints that determine fishermen's degree of independence: freelance fishermen for example – who are the majority of the population – need to work for private fishers, who are the ones who ultimately make decisions about when and what to fish.

Economic constraints, lack of technology, and subordination are only some of the underlying factors determining fishermen's economic activities. Tabasco fishermen face many other important challenges, such as changing water temperatures that are causing the emigration of species from the region, and the establishment of new fishing regulations that prohibit fishing activities close to offshore oil fields, which function as artificial reefs, so that until recently fishermen were able to find abundant species around them (Zalik, 2009).⁵⁹ These

⁵⁹ This regulation is Mexican Inter-Secretarial Agreement 117, implemented in 2003, that “restricts fishing areas surrounding oil platforms through the amplification of a ‘Zone of Exclusion’” (Zalik, 2009, p. 558). In interviews, fishermen explained that this particular regulation affected fishermen from other regions more – the neighbor community of Frontera for example. With this regulation,

new conditions increase fishermen's production costs and time because they need to go farther from their coasts; they also increases their risks. The lack of access to some fishing areas illustrates struggles over common resources and space that fishermen have historically had with the oil company as well.

4. Natural Protected Areas. There are other related adaptation measures, such as the establishment of new Natural Protected Areas in coastal regions that crosscut the discussion on resource exploitation and social inequality noted above. In the Mexican context, problems generated by the imposition of natural protected areas are many – for example, people can be displaced from their land. In many cases local inhabitants are never informed that their legal land has been expropriated by the government, so they continue to use the resources and then are penalized for it. Governments lack the capacity to enhance the law that prohibits access to some protected resources, because of a lack of human and financial resources or because officials engage in practices such as corruption, allowing the illegal extraction of species. As other studies have shown, this kind of initiative has, however, enhanced the economic power of a few local and extra-local actors that benefit from these illegal practices (Paz & Vázquez, 2002).

In my case study, two key challenges to implement this resource conservation initiative are: i) corruption and lack of enforcement of resource

fishermen need to go farther from their coasts to fish, with the increasing risks this type of enterprise implies. A local biologist explained in interviews that this regulation seriously impacts the security of fishermen, who until its implementation used to get help such as food and shelter from workers on the platforms – such help was especially relevant during sudden storms, therefore currently fishermen are facing more risks (Interview with a scientist from a research center. December 12, 2011. Tabasco).

exploitation laws and, ii) historical struggles for territories and their resources. Local government fishing authorities (fishery office) explained in interviews that population growth and resource scarcity are the key factors explaining overexploitation of local fishing resources. Corruption of both fishers and authorities is a major factor preventing accountability: fishermen fish certain species without having a formal permit, they take the risk of fishing species that have more value on the market without necessarily having a permit. As I explain in chapter 3, corruption of authorities and the role of middlemen are key in the functioning of the system as it currently exists.

A critical challenge in planning a conservation project in this area is the history of struggles local communities have faced over their resources: there is a lack of consensus among communities about their territorial boundaries for common resource exploitation. Fishermen's rivalries have resulted in murders and permanent tensions among local inhabitants. For fishermen, any conservation measure to protect their resources is in vain, since authorities do not do their job in preventing resource overexploitation and degradation carried out by fishermen from "other" communities. Fishermen argued: "Why would I protect the resources if the government is protecting – through corruption – other fishermen who come to our communities to use our resources without any limit, using illegal nets?"⁶⁰ But most importantly, even if they do want to help protect these resources, to do so they must put their personal security at risk – including the risk of physical confrontation.

⁶⁰ Interview with a cooperative member fisher. June 6, 2012. Tabaco.

In sum, the good will to promote the use of “alternative” species and protect coastal ecosystems to better face climate change would need to include a set of strategies to deal with the wide array of factors that currently determine resource exploitation.

5.4 The Crafting of an Adaptive Subject

In this section I argue that government climate change adaptation narratives articulate ideas about specific ways that coastal inhabitants should live and produce, but also how they should transform their social relations in order to better face climate change impacts – the ultimate moral goal. These narratives require the creation or re-creation of certain social representations and practices – the crafting of an “adaptive subject” (McNamara, 2006; Felli & Castree, 2012) or the rescue of glorious past practices (Fairhead & Leach, 1995).

In interviews, government officials explained that fishermen need to be “aware of” the climate change problem. Government narratives state that fishermen and local populations need “to understand” the relevance of the problem and the necessity of implementing adaptation strategies to better cope with it. The Tabasco Climate Change Plan includes the training of rural communities in vulnerable areas. It explains that this strategy aims to “sensitize local communities about the relevance of climate change by giving them basic information to identify the risks that they are exposed to, and to identify mitigation actions” (SERNAPAN, 2007, p. 39). For example, one manual was designed to help local promoters “help rural populations in their reflections and actions about

how to adapt”; this type of initiative aims to contribute to the formation of rural communities’ values, attitudes, abilities and capacities (SEMARNAT, 2008, p. 8). Along with the formation of such values and understandings, there is also the need to change a wide range of different aspects of local life, from the subject’s way of living to their social relations. Two examples illustrate these efforts:

(i) In interviews with provincial government environment officials, these officials expressed the need for the local fishermen to “assume their role” in the climate change crusade.⁶¹ They stated that “fishermen must adapt” to climate change impacts, which can either mean that they need to relocate from highly vulnerable residential areas, or that they must make other changes, such as using different housing materials to cope with coastal flooding.⁶² They pointed out the need for the fishers to bring back past practices or “traditions” to better face environmental changes.⁶³ Fairhead and Leach (1995) explain that one key component of degradation narratives is an idealized understanding of “past” practices and social relations, ideas that constitute a framework to interpret extant environmental changes. In the Mexican case, officials explained that fishers should adopt past practices such as building houses with traditional materials such as wood palm, and to raise the floor to avoid flooding. These officials expressed that fishermen should build their houses like in old times; they should

⁶¹ Interview with a government official from the Ministry of the Environment (provincial office). May 30, 2012. Tabasco.

⁶² Interview with a government official from the Ministry of the Environment (provincial office). May 30, 2012. Tabasco.

⁶³ Interview with a government official from the Ministry of the Environment (provincial office). May 30, 2012. Tabasco.

build “*palafitos*,” the kind of houses communities used to build with mangrove wood and with an upper floor – where people used to keep their basic staples, animals, and children from the flood. When I asked the fishermen about this type of construction, only few remembered that their grandparents or even great-grandparents had this kind of house, but nobody has actually lived in one or can remember them clearly. Government officials also explained that the government has a new initiative called “green house” in Tabasco, that includes the building of such *palafitos*. They expressed with confidence that these type of initiatives is the kind of “solution” they envision to face climate change impacts in Tabasco.

However, this line of thought about “environmentally friendly” past traditions and practices change when government officials referred to another type of adaptation measure. This glorification of past practices is put aside when, for example, officials proposed that fishers should change their livelihood activity: instead of being fishers, they should shift to fish farming. Formal adaptation initiatives have proposed the promotion of fish farming as a way to face the environmental changes fishers are experiencing as a result of climate change. Other activities were also seen as part of these adaptation measures that local inhabitants should adopt: if, due to climate change mangrove swamps overgrow pasture fields, then former livestock farmers should shift to mangrove growing.

Another task asked of fishermen is to support mangrove conservation initiatives. Government officials explained that a few years ago people from the Inter-American Development Bank held meetings with municipal authorities, local fishermen, and peasants leaders to present a conservation project “to protect the

mangroves” in Tabasco. In the meetings, a Bank officer asked the fishers “if they had the will to pay for the environmental services they were receiving from the mangrove.” Through these meetings the Bank was looking for local partners – and municipal funds – to finance the project. Government officials were not surprised at this type of request – a request for funding from the miserly budget local governments get from the central government, which is used to cover basic needs such as infrastructure, water supply, etc. – but rather at people’s responses to this request. Officials were annoyed at the fact that fishermen did not want to collaborate in this project. They made comments such as: “as you can see, fishermen do not want to do anything to protect their own environment,” or, “fishermen always want just to take but not give anything when the government asks them to collaborate.”⁶⁴ Mexican officials did not question the fact that the idea and project were conceived somewhere else and was not something that local communities proposed, in fact they were not consulted about it. Mexican officials, however, thought that fishermen’s role was to collaborate for a conservation project that, they thought, would directly benefit the fishers and contribute to the meta goal of facing climate change impacts.

(ii) The second case exemplifies how climate change narratives reframe contentious social relations in the study communities – relations that have been shaped by historic social, economic and political processes. Climate change narratives call for the reconfiguration of fishermen’s relationships with Pemex.

⁶⁴ Interview with a government official, Ministry of the Environment (provincial office). May 30, 2012. Tabasco.

The provincial government commissioned a non-governmental organization to conduct climate change workshops in coastal communities. The workshops' final report highlights recommendations to better adapt to climate change impacts. After recognizing "the discomfort" that the oil company has caused communities, the report calls for the need to reconsider the relationships between fishers and the oil company. The report highlights the need to change those relationships so that fishers might consider the oil company not as an "enemy" or "benefactor," but rather as a "partner." The implicit rationale for this recommendation is that the oil company is considered one of the most important actors in the development of mitigation and adaptation actions; therefore, such an alliance may enhance the effectiveness of climate change projects.

This "narrative of human responsibility" (Hamblyn, 2009, p. 224) calls for the accommodation of extant social relations towards the realization of an ultimate goal – communities' adaptation. Governments' aim to "reshape the conduct of fishers conduct" illustrates the profoundly political character climate change narratives can take on the ground. This case also illustrates Li's argument that when governments exclude political-economic relations from their diagnoses and prescriptions, they focus more "on the capacities of the poor than on the practices through which one social group impoverishes another" (Li, 2007, p. 7). This second case can be read in light of the discursive reconciliation referred above between the oil company and fishers; however in that case both were portrayed as victims of climate change impacts. In this example, both actors

are visualized as partners in their common responsibility to implement adaptation measures.

5.5 Discussion

This chapter illustrates three main features of Mexican government narratives about climate change: a) their antipolitics effect when attempting to conciliate opposed interests between Pemex and fishers; b) their technocratic approach in addressing climate change impacts and; c) their functioning as technologies of governance, promoting ideas to shape fishers' behavior and practices.

The first is the reconciliation of opposed interests that are linked together in the search of a meta goal, so that natural and human systems can better face climate change impacts. The antipolitics machine is at work in this narrative when initiatives overlook the contentious historical political issues – such as the struggle over contested resources – that are at stake when such initiatives involve resource use, access, and management, discuss environmental changes, or attribute responsibilities.

As I discussed, these narratives raise questions about the role of key actors in the production of local vulnerabilities, such as the oil industry. However, this recognition does not prevent these narratives from framing the climate change problem as external, “as a threat to everyone without blaming anyone or any sector” (Vink, Boezeman, Dewulf, & Catrien, 2013, p. 96). Felli and Castree (2012) argue that:

Although the existence of ‘poorer’ people (defined as those lacking in ‘social, political, and economic capital’), and who actually happen to be the

'most vulnerable' and the 'less mobile', is readily acknowledged, this is done in a context in which *all social actors are presented as having basically the same interests, rationality, and aspirations* differing only in the level of 'assets' they command (and thus in their 'adaptive capacity'). There appear to be *few social divisions and no social classes, nor contradictory or conflicting social interests* (except for an understanding of violent conflicts linked to resource scarcity, environmental degradation and the disruption of social cohesion) (p. 2, emphasis added).

In these narratives, fishermen's interests are explained within the broad self-contained label of "coastal communities." This simplification of social realities erases the multiplicity of local actors, the local politics in which they are immersed, and the multiplicity of interests and views about environmental changes. In my case study, interlocking processes such as industrial production (oil and sugar cane) and resource overexploitation and degradation are problematized in light of discussions about the need to reduce local vulnerabilities. The logic of these narratives is that if every sector and actor does their job – reducing emissions and implementing adaptation measures such as conservation – the result would be that these communities would be better equipped to face climatic changes. The contradictory interests of both the oil industry and fishermen appear to be resolved under the climate change umbrella.

The second characteristic of the narratives discussed in this chapter was the nature of proposed adaptation measures, which reflect a managerial approach to climate change impacts. I discussed some of these proposed measures in light of the complexities that fishermen raised in discussions of their

problems. The generic label of “fishery planning” as an adaptation measure, for example, may represent for fishermen a whole array of governance issues that are beyond the actual political will and capacity of authorities to address. Scholars have criticized these initiatives as band-aid solutions that do not address structural issues, which should go along with these types of measures. Ribot criticizes narratives that emphasize the need to adapt, since it is a term that obscures causality (Ribot, 2011). When we talk of adaptation, he explains, the first thought is “how do people adapt.” Therefore, an adaptation framing does not automatically draw us to ask “why do people have to adapt in the first place” (Ribot, 2011, p. 1161). Adaptation takes attention away from causality by shifting the focus from cause to response.

Adaptation initiatives “are not found in political or economic transformations, but are located at the individual/community level and essentially amount to increasing the ‘resilience’ of the affected populations to ‘external’ shocks” (Felli & Castree, 2012, p. 2). Scholars discussing climate change impacts in Mexico have called for the need to “transcend technocratic risk management” approaches to climate change, arguing that it is necessary to look for more “radical actions that call power relations into question” (Manuel-Navarrete et al., 2011, p. 250). As I analyzed in four examples of so-called adaptation measures – relocation, aquaculture, fishery planning and natural protected areas – their implementation may face different political, economic, cultural, and environmental challenges that are not currently considered in the government's field of vision when they define the climate change problem.

Finally, the third key characteristic discussed in this chapter were the behavioral, moral and ethical messages that climate change narratives promote. Climate change initiatives can also be understood as “technologies of government” in the making of environmental subjects (Agrawal, 2005).⁶⁵ In my case study communities, fishermen were asked to be conscious of “the climate change problem” as it is understood by government officials or NGO promoters. Paradoxically, they are asked to be conscious about a problem with which they have coexisted for a long time – coastal erosion. As discussed in the previous chapter, fishermen are expected to understand local environmental changes such as erosion as they are explained through government narratives; they are also asked to improve or change their fishing practices, to protect their ecosystems, and to relocate if necessary.⁶⁶ Finally, they are asked to change their relationships with the oil industry so that they can have a cooperative partnership for the implementation of better adaptation initiatives.

All of these statements are divested of politics, of power relations. The aim of these narratives is to shape local perceptions to align with what governments have defined as the key problems for coastal communities, such as climate

⁶⁵ Technologies of government are strategies to “shape the conduct.” and are “founded on a combination of knowledges, regulations based upon these knowledges, and practices that regulations seek to govern” (Agrawal, 2005, p. 220).

⁶⁶ The transfer of responsibilities to take measures “to adapt” and the attribution of new responsibilities to fishers resemble other initiatives in Mexico. An example is the case of social policies implemented in a context of neoliberal economic restructuring, the redefinition of governments’ responsibilities and the transfer of state responsibilities to citizens. Social programs such as “*prograsa*” and “*oportunidades*” are characterized as examples of the emergence of a new type of social policies that highlight the co-responsibility of the benefited population in their implementation (González de la Rocha, 2005). Jodar and Gómez (2007) analyze policy reforms of the education system and the emergence of a “neoliberal” competitive, adaptable, flexible, mutable, and self-responsible subject (p. 393). They define neoliberalism as a “new form to govern the social,” where subjects are “dispossessed” from their social background/context, they are “de-socialized” subjects (Jodar & Gómez, 2007, p. 399).

change. From a Foucaultian approach, the promotion of what government narratives called a “climatic culture” is a clear manifestation of the productive power of narratives and discourses that are promoting the re-arrangements of objects, subjects, and their social relations. As I discussed, these government narratives propose an arrangement of objects when they for example, promote the conservation of fishers resources and territories, which would imply a re-definition of what type of species and territories are to be protected; as well as when, how and who is entitled to use, access and exploit resources. The narratives also are representing subjects and their social relations when they promote the adoption of ideas and practices, or when they are asked to re-arrange their relationships with the oil industry.

CHAPTER 6. VULNERABILITY AND ADAPTATION TO CLIMATE CHANGE

6.1 Introduction

In this chapter I discuss climate change vulnerability and adaptation in national government narratives in order to develop two lines of analysis. The first is an analysis of the key role that government agencies play in shaping climate change discourses, and how national and local scientists are contesting them. My discussion analyzes the diversity of ways in which global frameworks are used (by government agencies) and adopted on the ground (by scientists), on how the “localization” (Hulme, 2008) of global discourses take place.

The second line of analysis addresses the processes of “simplification” (Scott, 1998) and “rendering technical” (Li, 2007) in the making of climate change interventions. To illustrate my discussion, I analyze three contentious topics that emerged in interviews and that are widely discussed in the climate change literature: the issue of uncertainty in predicting climate change impacts, the factors accounting for the making of people’s vulnerabilities, and finally, strategies to deal with climate change impacts.

In this chapter I discuss how government agencies have been instrumental in presenting to the public grand climate change narratives, such as the one derived from the IPCC and data produced by Mexican scientists. The analysis of government’s role is of particular relevance given that the emphasis in the literature has been on how global, top-down discourses are producing global environmental knowledge, norms and regulations. However, these accounts sometimes overlook the key role that government agencies – national and local –

have in re-constructing these framings. I argue that government officials shape the information to be presented publicly in a form that may be problematic for scientists, who point out the need to consider uncertainties (about where and how physical processes are going to take place, and their impacts), and for local inhabitants that hold different accounts of local environmental changes, as I explored in chapters 4 and 5. In contrast, in this research I explore how global narratives are mediated by a contextualized, multilayered set of actors and processes.

In my analysis, the concept of coproduction is helpful for understanding the role of both scientists and government officials in framing problems. In this chapter I question the classic one-way understanding of the science-policy interface, particularly the idea that science defines problems and their possible solutions, and that its advice is directly translated into policy. In this case study, the movement of science to policy is strongly determined by government agencies that – by assembling information from different sources – are re-framing the “what” and “how” of the climate change problem. This analysis also questions the relevance of epistemic communities in their efforts to both position topics and delineate public policies.

My second key argument in this chapter is that government narratives illustrate two important processes that Li (2007) and Scott (1998) discuss about government interventions: the processes of simplification and of rendering technical. These analyses illustrate how experts and policy-makers “exclude the structure of political-economic relations from their diagnoses and prescriptions”

(Li, 2007, p. 7). As I argue, climate change narratives recognize the political, social, economic and environmental factors that constitute the sources of climate change vulnerabilities; they also recognize that climate change impact is one among many risks that local communities are facing. However, the incorporation of these factors into climate change narratives does not necessarily mean that government agencies propose how to address these structural problems; instead the discussion focuses on how to tackle their impacts. This discussion illustrates how “simplification” takes shape in the case of climate change initiatives in Mexico.

Finally, in this chapter I aim to illustrate how global knowledge and narratives travel. Hulme (2008) explains that:

Knowledge that is claimed by its producers to have universal authority is received and interpreted very differently in different political and cultural settings. Revealing the localisation and spatialisation of knowledge thus becomes central for understanding both the acceptance and resistance that is shown towards the knowledge claims of the IPCC (p. 9).

In this case study, the “localization” of global discourses is illustrated in two ways: first, through an analysis of how a heterogeneous state adopts and shapes global narratives; and second, by analyzing the concerns and contextual issues that local scientists in Mexico incorporate into the climate change problem. This discussion also shows the diversity of ways in which “resistance” can take shape at the local level, by (i) prioritizing certain methodologies, approaches, or strategies over others; (ii) rejecting an uncritical assumption of climate change

predictions; or (ii) questioning as problematic the temporal dimension of the problem.

In the first section of this chapter, I analyze the issue of uncertainty regarding climate change predictions and impacts. The second section discusses how government narratives and scientists explain climate change vulnerability. Finally, the third section focusses on the different approaches to deal with climate change impacts as they are explained by state agencies and scientists.

6.2 Uncertainty in Predicting Climate Change Impacts: Planning for an Uncertain Future?

In this section I illustrate how government narratives deal with the issue of uncertainty in climate change impacts. I discuss how government agencies are instrumental in using and presenting climate change information, analyzing how uncertainty is a contentious issue. In my case study, the lack of certainty about the types of impacts the country is going to experience is not preventing the mobilization of government resources to elaborate climate change initiatives that aim to deal with such impacts – e.g. adaptation projects such as the Wetlands project, provincial climate change plans and the organization of workshops. I argue that in adopting this strategy to actively promote climate change projects regardless of the uncertainties about when, where and how climate-related impacts are going to occur, Mexican governments are making political and economic choices that are important to discuss. In particular, and as I analyze further in this chapter, in the context of developing countries the issue of when and where to locate limited government economic resources is important to point

out since it is an issue of defining what problems are being selected to be addressed and included in the government agenda and by whom.

Government narratives are based on a climatic-risk approach in which climate change is framed as an unquestionable phenomenon and an issue of public interest that is already having concrete impacts in Mexico. They emphasize the “global” dimension of the problem and the “urgency” in attending to climate change’s “inevitable” impacts (CICC, 2012a, p. 21). These narratives explain that Mexico is highly vulnerable to extreme hydrometeorological events, such as hurricanes, droughts, and flooding, phenomena that put both people and natural ecosystems at risk. These narratives also include information about other side effects, such as migration. Based on what have been called “crisis narratives” (Hartman, 2010), government narratives argue that climate change could increase migration flows, which may affect labor availability in the agriculture sector, increasing its vulnerability (CICC, 2012b, p. 146).⁶⁷

The recognition of these risks is followed by the acknowledgment of uncertainty in relation to climate change impacts in terms of their magnitude and characteristics, uncertainty about “when, where and how these impacts will occur” (CICC, 2012a, p. 26). As some scholars explain, “[t]he accuracy of climate

⁶⁷ In the document, this note is taken from Deheza and Mora’s (2013) study of the implications of climate change for national security, commissioned by the UK Foreign and Commonwealth Office. They argue that climate change “is expected to have profound impacts; reshaping resource distribution, creating new dynamics of ‘winners’ and ‘losers’, and complicating responses to problems of poverty and governance” (Deheza & Mora, 2013, p. ix). The authors conclude that “climate change will impact people’s ability to meet their basic needs... climate changes will not affect everyone equally, and this has the potential to exacerbate social divisions and tensions... climate change will compound existing challenges around governance and institutional capacity – increasing demand for disaster response and recovery, and the implementation of adaptive measures” (Deheza & Mora, 2013, p. ix). Hartmann (2010) frames this type of literature as “crisis narratives,” which elaborate on arguments that link climate change with violent conflicts and political stability, “based on old assumptions about relationship between environmental scarcity and violence” (p. 239).

predictions is limited by fundamental, irreducible uncertainties” (Dessai, Hulme, Lempert, & Pielke, 2009, p. 67). The IPCC (2013) defines uncertainty as

A state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from imprecision in the data to ambiguously defined concepts or terminology, or uncertain projections of human behavior (p. 1464).

The level of uncertainty is even greater when it comes to understanding these impacts at the regional and local level. In discussing physical and biological environmental changes, and their relationship with regional climate changes, the IPCC (2007) recognizes “a notable lack of geographical balance in the data and literature on observed changes, with marked scarcity in developing countries” (p. 8). In discussing global scenarios, Parry et al., (2005) explain that “[w]hile these models are useful in depicting general trends and dynamic interactions between the atmosphere, biospheres, oceans, land and ice, low resolutions limit their ability to tell us about regional and local impacts” (p. 3).⁶⁸

Therefore, the IPCC and government narratives highlight as an important task: the elaboration of regional scenarios⁶⁹ that integrate land-use changes as

⁶⁸ Jasanoff and Wynne (1998) explain that “computer modeling supplies an exceptionally powerful tool for reestablishing an authoritative space for science, even in areas of cognitive uncertainty, that is, the very domain of transience” (p. 8-9). Transience is defined as all “those issues that could be asked of science but to which science could not give answers” (Jasanoff & Wynne, 1998, p. 8-9). In this case, models would enter into the realm of transience because of the uncertain nature of their predictions. However, these authors argue, models in environmental science are not assumed to lay within the space of transience since they are conceived as tools that can “provide answers to political questions” (Jasanoff & Wynne, 1998, p. 9). In this way, models and modelers in climate change science are challenging the notion of transience by thinking of models as good tools to manage uncertainty (Jasanoff & Wynne, 1998, p. 9).

⁶⁹ During interviews, scientists working in the health sector pointed out the need to scale down global scenarios because they are looking for municipal indicators. It is the local scale that is

key drivers in local and regional climate change impacts (CICC, 2012b, p. 143). Government narratives explain that IPCC scenarios do not include land use change, which according to scientists represents a problem in cases such as Mexico, which has experienced important land-use changes that impact its vulnerability (CICC, 2012b, p. 143). Land-use changes, pollution, and invasive species are defined as “influential” factors in determining regional temperature variability (IPCC, 2007, p. 9). There are also other types of uncertainty – mainly with respect to the hydrologic cycle – “due to the extant limitations in the formulation of small-scale processes, that frequently are key in the case of the climate in Mexico” (CICC, 2012b, p. 141).

Government narratives explain that between 1970 and 2009, the frequency and intensity of hurricanes increased, especially in the Gulf of Mexico and the Caribbean Sea. A possible cause of this increment in hurricanes is the fact that water temperatures in the Atlantic Ocean have increased, and with them the intensity of hurricanes. However, narratives highlight that it is unclear whether this phenomenon is caused by climate change or whether there are other factors promoting its emergence (CICC, 2012a, p. 40).

These government narratives state that this uncertainty makes it difficult to plan and design adaptation actions; however, they also recognize the need to act independently of this uncertainty. This is an interesting position because scholars

useful for them, as they explain: “these models might have an influence on what could be done at the local level” (interview with a government official and scientist, Public Health Institute. May 27, 2011. Morelos). This is a clear example of how policy makers think of models as tools that can provide answers to policy, and as such do not form part of transcience but rather through technological development and improvements in data collection; they could be a very useful device for planning at the local level. Government officials in Mexico are then reproducing “complex discursive productions... that uncertainty can be continually reduced and contained within manageable bounds” (Jasanoff & Wynne, 1998, p. 10).

(Hulme & Mahony, 2010; Barnett & Campbell 2010; Barnett, 2001; Beck 2011) have criticized the fact that “uncertainty” has been a factor in preventing action in international and national arenas. This idea does not apply for the Mexican case, which shows that governments’ translations of global climate change policies and recommendations may differ around the world.

Scholars argue that uncertainty in climate change science – as it has been framed by the IPCC – has been a key obstacle in the implementation of solutions to climate change impacts. This is a problem with origins in the problem-process approach that is rooted in a linear chain of explanation, such as that adopted by the IPCC that “promises to deliver a ‘sound’ scientific foundation” to policy (Beck, 2011, p. 304). This framework produces a trap in which, as Barnett and Campbell explain, “as more scientific research is conducted in the name of reducing the uncertainties that are purported to impede action, new questions arise and further uncertainties can emerge. This further debilitates action” (Barnett and Campbell, 2010, p. 3). For scholars analyzing climate change in the Pacific islands, this model “impedes planning for climate change and accelerated sea-level rise” (Barnett, 2001, p. 977). From this perspective, inaction in proposing alternatives for facing climate change impacts – such as adaptation measures – is the product of a scheme that is more concerned with producing “certainty” as a way to legitimize climate change science, than it is with dealing with practical knowledge that policy-makers can use to design alternative interventions. And this production of certainty is a futile task, since uncertainty “is unlikely to be reduced in the near future, and in any event absolute certainty is impossible”

(Barnett, 2001, p. 997). From these critical perspectives, and “given the deep-seated uncertainties involved in predicting climate impacts” (Beck, 2011, p. 304), “decisions must be made in the face of uncertainty” (Barnett, 2001, p. 983). To highlight the need to reduce uncertainty renders problems “technical,” divesting them from their political dimension.

In looking at local contexts, however, this critical discussion of uncertainty can also be problematic. In Mexico, for example, an interesting criticism arose in interviews with scientists who discussed uncertainty and other ideas related to the topic of planning based on predicted future scenarios. The topic was analyzed in light of scientists’ analyses of the different challenges Mexico faces. At the core of their analysis was a concern over how to reconcile the idea promoted by the government of planning for an unpredictable future, with a context like Mexico where more urgent actions are needed in the present. They also contextualized this discussion in terms of different governance problems – economic, social, political and environmental – that are at the core of present climate variability impacts.

One of the most important Mexican meteorologists that has actively collaborated with the government in the creation of regional climate scenarios explained that Mexico is very vulnerable to extant climate fluctuations, which have had severe impacts. Mexico, he stated, “has not adapted to the present state of climate variability.”⁷⁰ Therefore, he argued, adaptation “is not an easy concept, because for example, you have never done anything to adapt to the

⁷⁰ Interview with a scientist from the Atmospheric Sciences Center (National University of Mexico). June 2, 2011. Mexico City.

variability of climate that has always existed. And suddenly you are asked to adapt to climate change. But you have never shifted to an intermediate stage, you have never adapted to today's variability and now you have been asked to adapt to the variability of the future". First, he argued, it is important "to adapt to the variability of the present climate before you ask for adaptation to climate variability in the future".

Another Mexican expert explained this topic as something related to the issue of "how to communicate risks."⁷¹ Mexican government agencies, he argued, do not understand what adaptation is in the first place, "they cannot talk about immediate things depending on what will happen in the future... you need to plan depending on the risks you have today, depending on what you have today... not in what it would happen in the future!". Mexican scientists brought up in interviews the question of how to make the issue of future impacts appealing to local governments that have a 3-year term in office. The point is "how to negotiate initiatives to attend the future when the present is more important for a politician."⁷²

These conflicting views about the temporal dimensions of the climate change problem have been discussed in literature that highlights the need to "look at the present" vulnerability, instead of analyses based in the future, on uncertain global scenarios (Burton et al. 2002, 154; Parry et al. 2005, Beck 2011). The shift to "the present" in the analysis of vulnerability and impacts introduces a novel lens through which to analyze climate change, an issue that

⁷¹ Interview with a private consultant from a private research center. June 29, 2012. Mexico City.

⁷² Interview a scientist from the Atmospheric Sciences Center (National University of Mexico). June 5, 2012. Mexico City.

has been taken up by development scholars who have pointed out the difficulty of pondering future impacts especially in developing countries that have limited resources (Burton, 2002). This is especially relevant considering that governments may actually waste resources if climate change impacts are different from the ones predicted under uncertain scenarios (Parry et al., 2005, p. 3).

In interviews, however, government officials did not share this perspective on the topic. One official explained that the Ministry of the Environment had actively promoted the idea of integrating future predicted impacts into government planning, without questioning their reliability. The official criticized that risk management programs, for example, are based on the risks that places and populations face today, and that result from present climate variability. She explained that the Ministry has promoted the idea of integrating future scenarios of climate change in order to know what kind of risks Mexico is going to face in the future.⁷³

In sum, “uncertainty” in Mexico has not impeded the mobilization of ideas, resources, and projects. Government climate change narratives do not put emphasis on climate change uncertainties – on future scenarios and lack of local data – but instead emphasize “impacts.” This is an example of how “simplification” (Scott, 1998) is at work, when government agencies choose to analyze and elaborate on the climate change problem by emphasizing some aspects (impacts) and omitting discussions that may question their approaches

⁷³ Interview with a government official from the Ministry of the Environment (federal government). July 13, 2012. Mexico City.

and frameworks (uncertainty, lack of data, etc.) for dealing with the problem. Furthermore, as Cozzens and Woodhouse (2001) explain “government becomes the key mediating institution where social actors participate, with varying degrees of influence and in a variety of structures, in shaping, interpreting, and using scientific knowledge claims” (p. 534). By emphasizing the need to attend to impacts, and avoiding a more in-depth discussion about the relevance of scientific uncertainty to policy planning and issue prioritization, government narratives frame the climate change problem in their own terms.

Here it is pertinent to take up Roe’s questions on government interventions, asking: What is going on when experts put forward these crisis narratives? What is the role of these expert narratives in decision-making? (Roe, 1995, p. 1066). From this perspective, these narratives allow experts or state officials to “claim rights to stewardship over land and resources they do not own” (Roe, 1995, p. 1066). In this case study, I argue that crisis narratives that frame the climate change problem based on a climatic-risks approach allow officials to delimit a “field of visibility,” which allows them to “intervene” in dealing with predicted impacts. This is a framework that justifies government interventions and determines “who and what is to be governed... what problems are to be solved and what objectives are to be sought” (Dean, 1999, p. 30).

Finally, in this section I have illustrated how local scientists challenge the temporal dimension of the climate change problem when they discuss government strategies to plan for the future based on uncertain predicted impacts, arguing that actions based on present conditions are more needed. The

position of local scientists illustrates how they, as key actors in the translation of grand narratives, are also continuously contesting them; this also shows the diversity of ways in which global frameworks are adopted on the ground.

6.3 Dealing with Complexity? The Underlying Causes of Climate Change Vulnerability

This section discusses how government narratives recognize the existence of different factors determining people's vulnerabilities to climate change. However, I demonstrate how despite this recognition, government climate change initiatives are not designed to address such structural factors; instead, they focus on how to face impacts. I argue that government agencies render technical contentious political issues that are at the core of climate change vulnerability. At the end of this section I analyze Mexican scientists' views on vulnerability, that to some extent challenge government narratives and point out contextual issues that are determining the degree of vulnerability of populations. This discussion illustrates the different ways global climate change frameworks are understood and challenged on the ground.

Government narratives recognize the complexity of explaining and assessing vulnerability to climate change. In their reports, they state that it is not their purpose to provide "recipes" to decision makers, but rather to transmit "the emergency" of needing to take into account climate change in government plans. These reports also aim to convey the need to understand climate change impacts, and to understand the usefulness of incorporating key social actors –

especially the most vulnerable – in decision-making processes and policy implementation (CICC, 2012a, p. 11).

These narratives point to the existence of a diversity of social, political, economic, and environmental factors as key drivers in determining vulnerability to climate change. Accordingly, in order to design adaptation proposals better able to respond to climate variability, it is first necessary to understand who is vulnerable, and what the sources of such vulnerability are.

However, government narratives argue that although climate change is a factor that “may have caused severe disasters,” such as severe drought in the North of the country or one of the most severe flooding events in Tabasco, the magnitude of their impacts are contingent on the degree of vulnerability populations currently have (CICC, 2012b, p. 127). They argue that the degree of vulnerability is determined by the country’s economic stagnation and recurrent economic crises that have impacted income distribution and poverty (CICC, 2012b, p. 127). Government narratives highlight that 68% of the population affected by natural disasters are people who live in extreme poverty, “who live in precarious households with less resilience to climatic events” (CICC, 2012a, p. 64). Climate change then is one among other factors causing vulnerability.

In the narratives governments recognize that the increasing impacts of floods over the last few decades has been exacerbated due to both increases in their frequency and because there are more people exposed to these events. According to one vulnerability index, 25% of the Mexican population lives in areas susceptible to flooding (CICC, 2012a, p. 43). Specifically, about half a

million people live in areas classified as highly vulnerable to floods (CICC, 2012a, p. 43). Narratives explain that land use change, lack of urban planning, and the deterioration of natural ecosystems are factors that play an important role in floods' emergence and potential impacts.

It is important to notice that the integration of vulnerability into government narratives differs significantly from other cases, such as the case of the small island states, since according to some scholars:

Statements about islands and climate change disproportionately focus on the environmental drivers of vulnerability – the changes in climate and sea levels and the fragility of island ecosystems – with little recognition of social factors that can enhance but can also significantly reduce the risk of damages arising from climate change” (Barnett & Campbell, 2010, p. 2).

In the Mexican case, however, the recognition of the existence of contextual factors determining climate change vulnerability has not included an analysis of how to address these factors. Such a discussion would consequently lead to focus on solving the root causes of climate change vulnerability.

To explain how government narratives integrate vulnerability into their analyses, I use the “Climate Change Adaptation in Mexico: Vision, Elements and Criteria for Decision-making” (CCAM) text which integrates case studies carried out by Mexican scholars as an example. One such case study was about coffee producers from two marginal and poor regions of Mexico, where peasants “need to adapt to many sources of vulnerability, not only climatic variability” (CICC, 2012a, p. 30). The author of this case study argued that coffee trade

liberalization during the 1980s was a key event in increasing the vulnerability of coffee producers, who as a result experienced price drops and variability. According to this analysis the insecurity in coffee prices were part of a long chain of impacts including a reduction in investments, technology, inputs, training, and a lack of access to credit.⁷⁴ The researcher also argued that it is under this scenario that climate change effects – such as rain and temperature variability that impact coffee plants due to an increment of pests and illnesses, or the increased frequency and intensity of storms and frosts – exacerbate the already severe social and economic vulnerability of coffee producers.

The CCAM report however, does not integrate this wide array of factors determining vulnerability into its analysis. Instead, the case study is brought into the narrative by highlighting that “social participation and organization” are important factors that strengthen peasants’ capacities to adapt. In chapter five I discuss adaptation and different criticisms of “enhancing adaptive capacities” that stem from a governmentality approach, which describes how these are also efforts to produce “adaptive subjects” (Felli & Castree, 2012; McNamara, 2006). From a government perspective, then, vulnerability will only be reduced if the country develops “adaptive capacities,” defined as the development of a system’s

⁷⁴ Within the climate change literature, scholars like O’Brien and Leichenko (2000) have characterized this situation as “double exposure,” analyzing “how global political and economic changes interact simultaneously with climatic risk to affect the livelihoods and development opportunities of particular populations” (p. 221). Scholars working on vulnerability in Mexico have also highlighted the variety of factors determining people’s vulnerability. Liverman’s (1990) work on drought in Mexico points out the need to look at the multidimensional variables determining people’s vulnerability to environmental changes. She states that “the impacts of drought on agricultural systems are determined as much by the technological, economic, and political characteristics of a region as by the severity of meteorological events” (Liverman, 1990, p. 49). In analyzing rural vulnerability to climatic risk in Mexican communities, Eakin (2005) explains the relevance of policies and institutional changes in influencing households’ capacity to deal with climate changes.

social and institutional capacities to adjust to climate change, and these adjustments may occur in “practices,” “processes,” or “social structures” (CICC, 2012a, p. 81). Local peasants should, by this logic, develop adaptive capacities to adjust to the different challenges they face, while macro-structural economic transformations or other structural changes are outside the field of visibility of government narrative framings.

Finally, the author of the above mentioned case study explained how peasants’ cultural practices in resource management – particularly productive practices such as multiple uses of grains or agricultural diversification – have helped them to be “flexible,” meaning that they have “the capacity to better respond to uncertainty” (CICC, 2012a, p. 81). The author highlighted peasants’ organizational efforts – through the creation of cooperatives – which have helped them get access to credit, information, and training. Government narratives integrate this case into the CCAM report to illustrate “how social participation and local organization at the community level are prompting adaptation experiences” (CICC, 2012a, p. 124). The narrative therefore recognizes people’s abilities to adapt, however it does not discuss how to address the structural factors causing vulnerability, instead focusing on how people may be able to cope with impacts through adaptation practices.

Government narratives focus on the question of “how” to face impacts (through adaptation measures) instead of discussing ways to address the causal factors of vulnerability in order to avoid addressing political-economic structures that determine the emergence of the climate change problem. As in other

development interventions (Li, 2007; Ferguson, 1994), government narratives “repose” political questions – the structural political, economic, social, and environmental sources of vulnerability – as “technical problems” – impacts that can be addressed through adaptation initiatives such as irrigation schemes, drought tolerant seed varieties, or infrastructure.

In these narratives, climate change is presented in all its complexity as a transverse problem that has multiple social, cultural, political, economic, and environmental dimensions. However, at the same time it is portrayed as a policy problem in which “risks are tractable and manageable by practices and institutions” (Shackley & Wynne, 1996, p. 280). A key piece of this process is the implementation of adaptation measures, represented as a strategy that, as some scholars have also stated, can modify climate change impacts, “and hence its seriousness or dangerousness” (Barry, Burton, Richard & Wandel, 2000, p. 224).

This approach contradicts some critical perspectives that argue that since there is a lot of uncertainty on climate change impacts, it is difficult to know whether adaptation would help reverse climate change impacts. For example, government narratives highlight that in order to meet adaptation goals, the country needs to acquire “a number of major technical and financial capacities to produce climate change data in terms of inventory emissions, climatic and economic scenarios, research and identification of technological barriers (CICC, 2012b, p. 4).⁷⁵ The National Climate Change Strategy, for example, identifies the

⁷⁵ Among the strategies outlined by the government to develop adaptive capacities are: (i) strengthening government capacities like policy-coordination and the development of legal and assessment instruments; (ii) restoration and conservation of ecological and hydrological systems; (iii) reduction of social vulnerability, including the identification of people settled in highly

economic costs of adaptation measures as one of the biggest obstacles to their implementation (CICC, 2007, p. 116). Some scholars criticize this approach as a “global environmental management discourse” (Adger, Benjaminsen, Brown, Svarstad, 2001) that “represents the technofix and market solutions” to climate change (Sandberg & Sandberg 2010, p. 17).⁷⁶ As I discuss in the previous chapter, this approach “offers the promise that problems are manageable... [it] suggests that social groups – communities, nations, all of humanity – can avoid the worst consequences of climate change by thoughtful preparation” (Orlove, 2009, p. 136).

But the process of “rendering technical” is also visible if we consider the social Darwinian origin of the concept of adaptation, which according to Ribot (2011),

evokes a social-Darwinist ethic when applied to people, implying those who do not survive (who do not adapt) were not fit. It burdens and blames the victim by devolving the onus of adjustment to the organism or affected unit. Rather than just helping people who have been pushed to the brink of crisis or stopping the social and political-economic processes

vulnerable areas in urban and coastal areas, the reduction of health-related risks, and the development of adaptation measures to strengthen food security and to guarantee a health diet access, and; (iv) reduction of vulnerability in productive sectors through the creation of a system of information and monitoring of climate change risks, vulnerability, and adaptation, to support decision-making processes. Finally, the strategies also include the strengthening of international cooperation, especially in trans-border issues; the inclusion of adaptation programming into the budget; linking knowledge, research, and technological development to decision making processes; the development of education policies; and social participation promotion (CICC, 2012a, p. 133).

⁷⁶ The following IPCC statement fully illustrates these criticisms when the institution recognizes that: “The array of potential adaptive responses available to human societies is very large, ranging from purely technological (e.g., sea defenses), through behavioral (e.g., altered food and recreational choices), to managerial (e.g., altered farm practices) and to policy (e.g., planning regulations). While most technologies and strategies are known and developed in some countries, the assessed literature does not indicate how effective various options are at fully reducing risks, particularly at higher levels of warming and related impacts, and for vulnerable groups” (IPCC, 2007, p. 19).

that are marginalizing them, the term adaptation... suggests that people should adjust and help themselves... to circumstances that are not of their making (p. 1160).

Vulnerability: The Need to Address Structural Factors

In interviews, scientists highlighted the structural political and economic contexts that determine climate change vulnerability in Mexico. One scientist explained that in Mexico, productive systems are already very weak – because of soil erosion, deforestation, etc. – such that “you do not need to have a great disruption to create a big disaster, a small drought or flood might have major impacts.”⁷⁷ This is an important comment that challenges government climate change narratives – “nature as the major threat” – since it emphasizes people’s current conditions more than the magnitude of any physical event.⁷⁸ These ideas resonate with critiques from scholars who state that vulnerability is “increasing for reasons that have nothing to do with greenhouse-gas emissions,” but is instead contingent on broader socio-economic changes in societies (Pielke, Prins, & Rayner, 2007, p. 597).

One scientist explained that what has happened is that the government and scientists have created climate scenarios, and based on these they have

⁷⁷ Interview with a scientist from the Atmospheric Sciences Center (National University of Mexico). June 5, 2012. Mexico City.

⁷⁸ Some scientists commented in interviews that the discussion of climate change in Mexico has put more emphasis on impacts on “trees and birds” than on people (Interview with a scientist from a local university. May 31. Tabasco). This scientist argued that government programs are not considering how fishermen that are not finding fish and need to go much further as a result, “maybe because a change of one grade in water temperature would make the fish and nutrients move, so fishers need to change their way of life”. He added that we are leaving aside human vulnerability, explaining that “it is not very popular to emphasize this, because it is very easy to discredit because nobody can see the future, therefore everyone is going to say ‘you are crazy, this is not going to happen, it is better to take care of nature instead”.

prognosticated possible regional impacts around which they have then proposed adaptation measures.⁷⁹ However, this scientist argued that a previous step should be taken before thinking of adaptation:

“first you need to know what creates vulnerability for fishermen, peasants, and you will see that there are many factors promoting vulnerability such as lack of government support, the massive importation of grains at very low prices. Vulnerability is caused by economic and political factors, and what we should do before designing climate change initiatives is to understand what policies are creating vulnerability in peoples and communities, independently of how the climate would behave in the future”.

These perspectives resonate with the sharp critiques of development scholars regarding the question of whether adaptation strategies are addressing the underlying factors that cause vulnerability in poor communities, or whether these initiatives just focus on responding to the impacts of climate change (Schipper, 2007; Christoplos et. al, 2009; Parry et al., 2005). This issue was discussed in my interviews. The expert who created the early warning system - labeled and implemented by the government as an adaptation measure – explained that this tool “is just an emergent measure, but there is a need to implement more structural actions like the implementation of sustainable development.”⁸⁰ He explained that these adaptation actions need to be

⁷⁹ Interview with a scientist from the Atmospheric Sciences Center (National University of Mexico). June 5, 2012. Mexico City.

⁸⁰ Interview with a scientist from the Atmospheric Sciences Center (National University of Mexico). June 2, 2011. Mexico City.

accompanied by structural actions; for example that “in relation to prevention systems, in the end, the problem is summed up by the need for land use planning.” Unfortunately, he added, “economic interests from real state agencies” prevent the implementation of more sustainable land use planning. As Eakin and Lemos (2006) argue for the case of Latin America,

As long as inequality persists, it is unlikely that the picture of increased vulnerability and low adaptive capacity among the poor in Latin America will change. At the heart of the problem may be the inability of the reconfigured state to tackle the growing social and political inequality that is central to the vulnerability problem.” (p. 16).

6.4 How to Deal with Climate Change Impacts? Risk Management and Adaptation Approaches

Government narratives and those given by scientists in interviews framed climate change adaptation in very different ways, which is important to highlight because it questions the science-to-policy linear model. The common understanding of science-based policy is one that implicitly emphasizes the existence of a singular fact-based diagnosis and solution of posed problems, leaving the role of governments as purely managers of science recommendations. S&TS scholars criticize such linear model; they understand the science-policy relationship as a coproduction, in which both set of actors actively promote and create framings of problems and their appropriate solutions. This section illustrates not only the active role of policy officials in framing climate change problems, but also shows the heterogeneous nature of state institutions using competing approaches to

climate change. This case study illustrates the diversity of processes that mediate how global knowledge(s) and framings are received and accommodated within different state agencies that mobilize their own understandings of the climate change problem.

A case of point is the existence of two main approaches to deal with climate change within the government: the risk management approach and the adaptation approach. The Ministry of the Environment is in charge of promoting climate change adaptation. In interviews, an official from this Ministry explained that her office has faced two main challenges in positioning climate change within government agencies. The first challenge has been to change the perception among government officers that adaptation is only part of the environmental policy arena, or an issue that pertains specifically to the Ministry of the Environment. When they called for a meeting on climate change, she explained, people from other government offices such as the Transport sector “did not really understand why they were called to the meeting.”⁸¹ Their first task, then, was to make officials “become conscious of climate change adaptation as a crosscutting issue” of concern to many sectors. The second challenge, she explained, has been to approach climate change adaptation as something beyond a disaster risk management approach. Climate change adaptation, she explained, “is not only about populations at risk, but it has to do with ecosystems, productive systems,

⁸¹ Interview with a government official from the Ministry of the Environment (federal government). July 13, 2012. Mexico City.

infrastructure.”⁸² There is a need to position the issue beyond the framework of risk, and to integrate adaptation more broadly within development planning.

Government narratives present inconsistencies and contradictions in both written and non-written narratives. In the CCAM report the government explained that in Mexico, adaptation is being framed within a disaster risk management approach, with the objective of reducing, preventing, and controlling the occurrence of disasters in populations, sectors, or regions (CICC, 2012a). A Mexican scholar explained that the risk management approach used by the Ministry of the Interior has much more political leverage than the framework on sustainability promoted by the Ministry of the Environment. Climate change transverses many issues, such as health, agriculture and disaster management. As a result, the Ministries of the Interior, of Health and of Agriculture are dealing with the climate change on their own, with their own priorities and agenda. Furthermore, the approach to adaptation used by these government agencies is much more practical, in the sense that it is concretely translated into projects to attend to populations at risk of natural disasters.

An example is the Ministry of Agriculture, which created a climate change office and has implemented specific measures such as the introduction of crop insurance for peasants.⁸³ In the interviews it was explained that the most important agency – with both public and private capital – dealing with climate change is the Mexican Insurance Association, since it already has climate change experts dealing with floods, hurricanes and other climate-related

⁸² Interview with a government official from the Ministry of the Environment (federal government). July 13, 2012. Mexico City.

⁸³ Interview with a private consultant from a private research center. June 29, 2012. Mexico City.

impacts.⁸⁴ Private insurance corporations then, are part of this new institutional configuration of public and private agencies dealing with emergent issues such as climate change impacts.

Other actions include the implementation of an early warning system and the Natural Disasters Prevention Fund, promoted by the Ministry of the Interior, in charge of the Attention to Disasters office. Another key office that has been very important in terms of the research and implementation of climate change initiatives is the Ministry of Health that during the last ten years has played a key role in analyzing, providing information, and discussing climate change health-related adaptation measures. In sum, these agencies have much more room for action based on their budgets, and also on the nature of the activities they deal with (agriculture, health, natural disasters). The Ministry of the Environment lacks political power and budget to lead and promote the topic of adaptation more broadly, incorporating ecosystems' conservation and protection.

The private climate change consultant also explained that in the international arena, a disaster risk management perspective has dominated the discussion on adaptation, as opposed to a sustainability approach. The difficulty posed by the mainstream position of adaptation, he explained, also lies in the polemic nature of the term, its Darwinian origin, and in the fact that, as some anthropologists have noted, human beings have always adapted to different environments (Ibid.).

It is important to mention that this configuration of government agencies and their climate change agendas reflects how government narratives are being

⁸⁴ Interview with a private consultant from a private research center. June 29, 2012. Mexico City.

negotiated within the government. In this dissertation, narratives are conceptualized as the result of an ongoing process of negotiation among state and non-state actors and agencies that form complex networks of institutions that design and implement climate change initiatives. Post-positivist policy studies highlight the productive nature of policy-making, where contentious policy values are continually negotiated, and policy actors are continually constructing competing narratives about public problems (Wesselink et al., 2013).

State structures are not monolithic. In the case of climate change policies, the Ministries of the Environment, Energy, Agriculture, and Health each pursue their particular perspectives on the topic and promote their own agendas within and outside government spheres. This is very clear in the following example, in which the Ministry of the Environment actively promoted the incorporation of Mexico into the Kyoto Protocol, while the Ministry of Energy rejected this position. Pulver explains that in the negotiation process, the energy sector “voiced a policy position that was critical of the international climate negotiations and opposed a global treaty mandating binding greenhouse gas reductions” (Pulver, 2007, p. 241). The interviews confirmed this rivalry between the two ministries, which was also reflected in the recently released Climate Change Law, and in many other government initiatives. In an interview, a climate change private consultant explained that the energy sector “has been repellent, impermeable to the climate change discourse.”⁸⁵ The expert explained that it was senators, and not the Executive branch, who promoted the above-mentioned law; he also explained

⁸⁵ Interview Interview with a private consultant from a private research center. June 29, 2012. Mexico City.

that the executive branch made promises to reduce emissions during the COP16 in Cancun, without any structural internal support. This shows some of the paradoxes of how governments and other actors are dealing with and negotiating climate change meanings in Mexico.

6.5 Discussion

In this chapter I have illustrated how global knowledge and narratives travel, arguing that their trajectory is highly determined by different actors and processes. They do not travel directly from the international/global to the national/local, in a top-down direction. Rather, this process is mediated on the one hand by government agencies that instrumentally use these discourses, and on the other by scientists' perspectives that question and challenge such narratives.

The transfer of global knowledge(s), values, and perspectives is not linear, but takes different forms that are contingent on power asymmetries that determine the prevalence of certain frameworks and practices over others. Global climate change frameworks are adopted by a heterogeneous state; they are negotiated among state agencies that hold different resources and power, which are used to mobilize their particular approaches and strategies to the problem. Global narratives are not singular, and they do not come from particular sources – such as the IPCC – either. Government narratives reflect this diversity

of actors, sources, and perspectives, which come from particular sites of knowledge production such as North America and Europe.⁸⁶

As I explained in this chapter, by assembling climate change data and analyses from the work of scientists – as well as by highlighting certain knowledge and frameworks – government agencies are re-producing knowledge and re-framing the climate change problem on their own terms. The way scientific information is presented sidesteps to some extent the discussions of “uncertainties” highlighted by scientists.

Shakley & Wynne (1996) explain that according to a dominant narrative, “policy ideally should rest on reliable, robust, and hence certain scientific knowledge”; scientific uncertainty could lead to policy uncertainty limiting the authority of both scientific knowledge and policy making (p. 276). In their work they elaborate on how uncertainties are communicated and how scientists negotiate their credibility. In the Mexican case however, climate change uncertainty is not an issue to be negotiated. In this case uncertainties pointed out by scientists about where, when and how climate-related impacts are going to occur are not preventing the government from promoting its projects.

The role of government illustrates the process of coproduction, in which the emergence of climate change knowledge takes place. It also illustrates the multilayered context of actors and processes that mediate the science-policy

⁸⁶ This characteristic incorporates a relevant dimension in the analysis of the production of narratives in Mexico; approaches such as the geographies of science and knowledge production discuss power relations and who and for whom “scientific knowledge is made, mobilised and valorized” (Hulme, 2010, p. 559).

interface, which questions classic understandings of this relationship as a one-way, “pure” process from science to policy, or from knowledge to power.

Scientists have also been key actors in introducing and promoting climate change within the government agenda. They are also active in the processes of localizing global narratives by introducing contextual concerns into the debate. These scientists challenge government practices and frameworks not only by criticizing them but also by demarcating their work and perspectives from that of the government. In doing this, they are implicitly promoting a kind of boundary work, which in this context is understood “as the attempts by actors to define practices in contrast to each other through demarcation” (Hoppe, 2010, p. 111). This practice is also a form of legitimizing their work and initiatives, a process of “purifying” (Latour, 1993) their actions and activities from those of the government. Scientists are then actively legitimating science by establishing a separation between science and policy; and by doing that they are also reaffirming two classic discourses on the relationship science-policy. On one hand they recognize the role of science in policy-making while responding to specific public issues of concern – science as mission-oriented or needs-driven science (Jasanoff & Wynne, 1998, p. 7). On the other hand, however, they sustain the ideas of the role of scientists positioned “apart from politics while proffering impartial knowledge to formal policy institutions” (Jasanoff & Wynne, 1998, p. 8). Gieryn (1995) explains that scientists’ need to separate from politics responds to their need “to protect their autonomy and authority from usurpation or control by outsiders” (p. 394).

A second key argument of this chapter is that government narratives illustrate the process of simplification that state governments undertake in their task to make societies legible. These narratives are a form of knowledge. They allow governments to narrow their definitions of a problem they want to solve. Scott (1998) explains that

“[t]he great advantage of such tunnel vision is that it brings into sharp focus certain limited aspects of an otherwise far more complex and unwieldy reality. This very simplification, in turn, makes the phenomenon at the center of the field of vision more legible and hence more susceptible to careful measurement and calculation” (p. 11).

The reduction of the complexity of climate change vulnerability and its transition into specific managerial adaptation measures form part of this process of making climate problems legible for government agencies. Along with the process of simplification comes a depoliticization of contentious political issues that are at the core of the climate change problem. As discussed in this chapter, government narratives recognize some of the underlying factors causing climate change vulnerability; however, they do not analyze how to address these causes. Instead of addressing questions such as “why are people vulnerable or at risk,” a problem that implicitly leads to the question of “who’ is responsible”, government narratives based on a climate change impact approach discuss the question of “what government should do to promote the adaptation of people to risks” (Ribot, 2011, p. 1160). This simplification of the problem focuses on how to promote adaptation instead of how to address the root causes of vulnerability.

As Li (2007) argues, the design of government interventions is a “deliberate measure to contain a challenge to the status quo” (p. 8) that in terms of climate change would mean the perpetuation of capitalist relations of production that induced a specific rationality for the use, exploitation, and transformation of the biophysical world. Government interventions contribute to the continuity of this system through the implementation of clean technology and market mechanisms to reduce greenhouse gas emissions, on one hand; and through the implementation of adaptation policies that promote practices to better navigate the impacts and changes already taking place on the other. Government narratives are illustrative of Li’s argument, when they state that adaptation is a “strategy to strengthen the resilience of a society, with the ultimate goal of building a model that under a different climate keeps given viability to the development model” (CICC, 2012b, p. 127).

Li’s (2007) ideas resonate as well with critical climate change literature. Felli and Castree (2012), for example, argue that climate change narratives are consistent with neoliberal views in environmental governance, explaining that these frameworks

might, in the long run, help precipitate yet another ‘neoliberal environmental fix’... in this case one focused on producing ‘adaptable’ human subjects: that is, people able to respond tactically to anthropogenic alterations of the biophysical world while becoming ever more the subjects of capitalist market relations (p. 1).

From a social justice perspective, scholars have criticized the emphasis on adaptation that diverts attention away from underlying causes of climate

change such as greenhouse gas emissions, and the different roles of developed and developing countries in creating the problem. S&TS scholars that discuss critical approaches to climate change have highlighted that

[t]he specifically global scaling of climate change highlights more general concerns about the effects of increasing GHG concentrations on the earth's radiation balance at the expense of other ways of formulating the problem, such as the structural imperatives of the capitalist economy driving those emissions, and indeed of other problems, such as poverty and disease (Demeritt, 2001, p. 313).

As I analyze in previous chapters, Mexican scholars have also criticized government narratives by pointing out the problem of attributing to “climate change” a wide array of old unsolved governance problems that are at the core of different environmental changes – policy implementation, corruption, lack of planning, or land speculation. I argue that climate change narratives have been instrumental for governments in two ways: first, in veiling structural development problems by putting them under the label of climate change risks, and second, by reframing the solutions to such problems under the label of “adaptation,” which, as I explain in the next chapter, is in many cases just another word to name extant policy instruments that have not actually worked on the ground.

CHAPTER 7. CONCLUSIONS: DEMOCRATIZING THE IDENTIFICATION OF ENVIRONMENTAL PROBLEMS

7.1 Introduction

Political ecologists have stated that through narrative analysis social scientists may contribute to the “democratization” of the identification of environmental problems by different actors (Batterbury et al., 2007). My dissertation contributes to this discussion by bringing into the analysis and making socially visible different perspectives and views – from governments, scientists, and fishers – on climate change adaptation and on environmental changes. In my research, the analysis of different interpretations questions issues of problem definition, specifically regarding how actors are defining problems (diagnosis and solutions) and the type of knowledge used to interpret them.

The analysis of different narratives allows us to identify the problems with using dominant frameworks for explaining local changes. In my case study government narratives have a dominant voice in terms of designing, implementing and mobilizing resources in climate change projects and initiatives in Mexico. Therefore, the relevance of integrating into the discussion other less visible perspectives from scientists and fishers allows us to identify how dominant frameworks on climate change adaptation convey ideas and assumptions that are problematic for local inhabitants experiencing local environmental changes on the ground. I argue that accounts of environmental changes should be more inclusive and consider the existence of multiple sources of knowledge and

understandings about them – specifically local environmental knowledge and the political economic context in which it emerges.

This research aims at understanding how climate change adaptation is understood and explained and how these interpretations are translated into different kinds of initiatives and projects. I conducted a close inquiry into how written and non-written narratives define problems, attribute responsibilities, explain solutions, and elaborate on ideas about the role of subjects of government. A broad question this research addresses concerns the implications of promoting global frameworks to explain local environmental changes. The questioning of predominant narratives is important since they are producing and legitimizing policies and projects that have an impact on people's lives.

The research is based on a case study constituted by five coastal communities in the Southern Mexican state of Tabasco, located in the Gulf of Mexico. It draws on qualitative analysis based on the implementation of 133 interviews and participant observation with government officials, scientists and fishers, at national and provincial levels. In this chapter I discuss the research questions of this dissertation and at the end of the chapter I explain the main contributions and limitations of my research.

7.2 What are the Implications of Promoting Global Frameworks to Explain Local Environmental Changes?

I have discussed two interrelated implications that climate change adaptation frameworks have in this case study. The first is ontological and epistemological in character, since it concerns government officials, scientists and fishers' views

and assumptions about coastal changes and how they elaborate on that using different types of scientific and non-scientific knowledge. The second interrelated implication is political; it elaborates on how certain explanations ignore local contentious issues.

a) Scientific and Non-scientific Interpretations of Environmental Changes

I have discussed the existence of various scientific frameworks that explain the emergence of coastal erosion. These come from climate change frameworks used by government narratives, and from geology and coastal ecosystems studies. I also analyzed fishers' views of environmental changes that are based on local environmental knowledge and the political economic context from where they emerge.

Government climate change narratives draw attention to issues such as coastal erosion, which is explained as a climate change impact resulting from sea level rise caused by melting glaciers. Coastal erosion is framed as a clear manifestation of the urgent need to act, to implement projects or policies to address climate change impacts in coastal communities. Government narratives use IPCC frameworks that are based on what is referred to as climate change science, a cluster of different sciences such as atmospheric sciences, marine and coastal sciences, physics, etc.

In my case study, geologists have studied the area since the 1940s, and their conclusions are different from the ones derived from government climate change narratives. Geologists have concluded that in Tabasco the main driver of

coastal erosion is land subsidence, which has mainly been induced by the extraction of ground water, gas and oil. Geologists also highlight that there are other factors counting for the emergence of erosion in Tabasco, in particular the building of artificial openings along the coast and the building of breakwaters, jetties, and deepwater ports. Furthermore, as I discuss in chapter four, scientists argue that coastal processes are very complex, which makes it very difficult to establish a causal one-dimensional relation between sea level rise and coastal erosion. However, in this case governments did not use geologists' diagnoses to mobilize resources or justify government interventions to prevent or propose solutions to coastal erosion in Tabasco.

There are also others scientific explanations of coastal erosion. Scientists studying coastal systems – biologists, engineers, morphologists, marine-science scientists – explain erosion as both a natural phenomenon and a human-induced problem. A clear example is the building of infrastructure and urban developments in areas that otherwise would serve to accommodate natural physical coastal changes. Furthermore, other types of infrastructure such as seawalls built as a preventive “solution” to erosion are, instead, having adverse effects by shifting erosion problems to other locations.

As I discuss in this dissertation, fishers – cooperative members, private and freelancer fishermen – agree with this latter group of scientists studying coastal dynamics, in identifying infrastructure built by the state-owned company Pemex as the main driver of erosion in their coasts. There was also one fisher who mentioned that erosion could be caused by the fact that the land is sinking –

what scientists explained as land subsidence – and he ventured the idea that maybe this was happening because there was a lot of oil being extracted from the underground. Fishers also discussed the role of urban and industrial infrastructure – houses, roads, and oil pipelines – that have caused deforestation in their coasts, which they explained as an important factor in the emergence of erosion. I also found other views on this phenomenon, which do not entirely define this coastal phenomenon as a problem in the first place, but as part of a natural cycle.

Scoones (1985) explains that some interpretations of environmental change ignore non-linear, multi-directional, reversible, dynamic and non-equilibria possibilities for processes of transformation (1985, p. 162). A close inspection of the above-mentioned scientific and non-scientific explanations shows how they differ fundamentally in their interpretations of the variables in environmental changes.

The existence of these interpretations of coastal erosion highlights important questions in Science and Technology Studies, such as: What science counts? Why do certain approaches generate the mobilization of ideas and resources while others are overlooked? Why and how do governments endorse particular frameworks? In this dissertation I have partially pointed out to some issues that shed light on these questions. I highlighted the role of epistemic communities in promoting certain issues in the government agenda. I also discussed how states are constituted by different agencies that have their own climate change agenda, some of them holding more financial resources than

others, which help them to mobilize their ideas by creating climate change related offices, designing projects, or engaging in collaboration with the private sector such as the case of insurance companies that are instrumenting initiatives on climate change impacts on crops. The prospective of getting financial resources for either their agencies (government) or research initiatives (scientists) is another factor to consider. The fact that climate change adaptation is underfinanced, and in the case of Mexico, the decision to accept financial resources that will indebt the country pose important issues.

In privileging certain frameworks over others, Mexican governments are also making political choices that endorse certain positions and voices, and that brings up the question of how knowledge is produced, and by whom. A critical issue highlighted in the literature is, for example, the overrepresentation of Northern scientists and scholars from developed countries in the scientific committees and fora in which climate change frameworks are produced. Another related concern is the type of disciplines that are informing climate change frameworks. As I mentioned in the case of Mexico, climatologists have a key role while social scientists are excluded from the discussion. Mexican governments engage in a more fundamental political endorsement when they support climate change frameworks produced within international organizations such as the IPCC. I am referring for example, to the ethical dimension of the climate change problem which points at inequality and responsibility, as well as about the role of the economic world system as a main driver determining human-nature relationships.

b) Depoliticizing Environmental Changes

I have demonstrated how government climate change adaptation narratives depoliticize and dehistoricize environmental change. Climate change government narratives that explain coastal erosion in Tabasco have specific ways of framing the origin of the problem, of attributing responsibilities and causes, as well as posing possible solutions of the problem. I have discussed how government narratives obscure the existence of local politically contentious issues. Government narratives avoid attributing responsibilities to the oil industry in producing local environmental and physical changes that have impacted fishers' ways of life and livelihoods; they fail to recognize other governance issues that have deteriorated people's environment and resources; and finally, they also overlook the existence of power relations among different actors, which determines people's access, control and resource management.

Using a climate change approach allows governments to frame the problem in specific temporal and spatial dimensions. In framing the issue as "external" to the local setting, and a result of "global" process such as greenhouse gas emissions that cause glaciers to melt and produce sea level rise, governments divert discussion of their responsibilities. These would include enforcing environmental and planning laws to prevent deforestation that, according to some perspectives, are among the factors that have generated beach erosion in some communities. Therefore, a problem that could be explained as a governance issue, which is closely intertwined with economic and

political issues, is explained as external, part of a global process, which requires common efforts to be solved.

Marston argues that in analyzing public policies, “we need to pay due attention to the everyday struggles over policy meanings and deeply held convictions – stories of conflict and contestation that are often missing from textbooks on how policy development ‘should’ happen” (Marston, 2004, p. 5). In my study fishers disclosed competing problems that are the product of past state interventions in the region, in particular the imposition of an oil exploitation strategy which has given rise to struggles over people’s lands and their marine and coastal resources. Fishers’ views of environmental changes have been shaped by their long-standing conflict with the oil industry that has had catastrophic environmental impacts on this region, affecting people’s livelihoods. In this context, it should also be noted that the interaction between fishers and the government has been characterized by the corruption of both the authorities and the fishers’ leaders, by the negotiation of certain privileges for some groups and leaders, and by problems such as the lack of enforcement of fishing norms like the restrictions about use of nets and about the closed season.

It is in light of their conflict-ridden relationship with the government that local fishers have also developed their understanding of the causes of many of their problems, which they attribute to decisions by the Mexican government and the state-owned oil industry – as opposed to problems caused by nature or climate change. There, coastal erosion is perceived not as a consequence of

changes in the environment, but as a phenomenon caused by the effects of the infrastructure that was built to support the oil industry.

Government officials from national agencies may not be aware of the existence of competing views about environmental changes that challenge their climate change narratives. Therefore, one can hypothetically argue that overlooking such local issues could not be a deliberate strategy. In that respect, fishers are out of the lens. In government narratives fishers are not conceived as active subjects sustaining particular views about their environment. They are instead conceived as victims of a global process – climate change – in which, however, they are asked to collaborate and change their practices in order to better face climate change impacts.

This, however, is not the case for provincial government officials. In an interview with a provincial government agent I asked him explicitly about fishers' views regarding the fact that Pemex caused erosion in their beaches. He disregarded fishers' positions explaining that they have always complained about everything, that their only concern is to blame Pemex and to look for strategies so they can get economic resources from the oil company. As I discuss in this dissertation, he also mentioned the "claim-making business" in which fishers have been engaged for decades with the oil industry. If in the first case national government officials may overlook local issues due to ignorance, in this latter case where local officials are aware of local politics, fishers' positions and local struggles are overlooked by government narratives precisely for being contentious political issues.

7.3 How Are Climate Change Adaptation Narratives Shaping New Development Discourses?

I have discussed how government narratives are “disposing” things, events and people, in particular ways that may be problematic for local inhabitants experiencing climatic and non-climatic stresses. Government narratives about adaptation a) propose forms of “adaptive” action that replicate and reinforce problems historically associated with critiques of “development”; b) necessitate the crafting of an “adaptive subject” and c) attempt to reconfigure social, political, and economic relations in the region – making fishermen/oil into allies against climate change.

I argue that climate change narratives resemble past development interventions in relation to, for example, who is determining what problem is important for local inhabitants. In my case study, concerns about climatic changes as they are framed in climate change frameworks – e.g. hydrometeorological events explained as the result of climate change – come from actors and institutions external to coastal communities – such as NGOs and state agencies. In my interviews, fishers noticed certain changes in how these meteorological events manifest: in the past they experienced less severe hurricanes and storms, but lasted long periods (weeks); now they experience short-term (hours) events but with the particularity that they are much more aggressive in nature. However, local concerns over the impacts of hurricanes and storms focused on the lack of state support in emergency events, when they are isolated without power or supplies. Fishers did not identify this type of problem as the most important for them and their communities. In fact, as I

discussed in this dissertation, fishers' perceptions about local challenges and immediate problems were determined by the specific economic constraints they experience in a context of economic crisis and poverty.

In light of this finding I might argue that fishers' opinions resonate with scholars' arguments suggesting that climate change is "essentially a Northern" issue, because many actors in Third World contexts are more concerned with daily local immediate basic needs – health, employment – than with long-term global threats (Demeritt, 2001, p. 313). However, interviews with fishers suggest that this type of generalization does not necessarily reflect the complexity of peoples' views and concerns about their lives in particular, and about their world in general. For example, when some of them talked to me about what they have learned from television reports about the melting of glaciers, they manifest their awareness of the magnitude of the problem. To frame the discussion in terms of what is more or less important for local inhabitants is not useful. In my case I show how fishers identified their problems, and which ones they overlooked or highlighted. My argument goes in the direction of how a problem is presented, for whom, and the type of implications this framing brings in terms of addressing or dismissing local concerns about it.

As with past development initiatives, government climate change narratives promote particular ideas and practices, which are envisioned as mechanisms to face impacts. One of them is, for example, to create awareness about the "climate change problem" as it is defined by government agencies; to make visible and explain a problem that "fishers do not understand." This

strategy relies upon a particular conception of “others,” as subjects that need to be instructed, oriented and guided. Even though coastal erosion has been part of fishers’ daily life, state officials believe in the need to make them “conscious” about erosion as it is framed in government narratives: erosion as a climate change impact.

These efforts to raise consciousness about the problem form part of many other steps to be taken in order to face impacts. There is an ideal conception of a better future where conscious people implement adaptive strategies to cope with climatic changes, an ideal where an adaptive world would make it possible to stay on the path towards “development.”

The making of an adaptive subject involves people’s adoption of particular ideas and new practices. As some scholars have criticized, at the core of the problem is the fact that people are “forced to bear the burden of environmental damage, expected to ‘deal with it’ internally, and find local coping mechanisms” (McNamara, 2006, p. 165). The adaptation initiatives analyzed in this dissertation promote a set of practices moving towards a more sustainable fishery sector. However, this is a list of good intentions that fail to consider the political economy of those coastal communities – identities, local ideas and perceptions, power relations.

My research findings demonstrate how struggle and conflicts over resource access and control also involve “struggles over social identities, discourses, values and concrete practices” (Marston, 2004, p. 4). The emergence of adaptation ideas such as the promotion of aquaculture for

example, is seen by fishers as a threat, an attempt to change their identities as fishers, to throw them out of the sea, lagoons and rivers so other powerful actors (the oil company) could make use of their territory and resources. I argue that government initiatives that are presented as “neutral,” promoting strategies to help people and coastal ecosystems face climate changes, are however highly contentious since they have to do with resource use, control and access. A close analysis of social perceptions of environmental changes, and the controversies around some issues, illustrates that efforts to position climate change may be a contested process on the ground.

Some climate change criticisms revolve around the issue of how the climate change problem is presented in a managerial mode, sometimes in terms of cost-benefit analysis. I have discussed problems associated with such technocratic perspectives on adaptation. Even though they integrate issues of vulnerability and the recognition of social and economic problems, the solutions proposed in such initiatives are not structural in character. The framing of the climate change problems based on vulnerability analysis does not convey ideas about how to solve the problems that are generating such vulnerabilities. These narratives, I argue, are the product of processes of simplification undertaken by state agencies in their effort to grasp the complex reality in which they want to intervene. As I have demonstrated, through simplification governments depoliticize historical events and processes that are the core of the type of problems adaptation measures try to address.

This dissertation discusses how some adaptation measures proposed are in fact old policies that are already part of existing laws and regulations. The problem that such climate change initiatives avoid discussing and addressing is precisely how to overcome the diversity of problems that are preventing state agencies to actually implement such regulations. It is the lack of implementation of already existing plans and programs that constitutes the core of the problem.

Historically, Tabasco has been a province where governments have tested different development “experiments” that have resulted in a “harmful development” for people and their environments. It is in this context where the analysis of new state interventions that are emerging under the label of climate change initiatives becomes particularly relevant. Through this research we already know that climate change adaptation initiatives that claim to look for strategies to restructure existing human-nature relationships are not designed to address existing environmental problems in Tabasco, nor to deal with the different struggles over the territory and its resources. How such interventions would make a change without addressing structural issues on the ground is not clear. In Tabasco, it is still a pending task to trace the trajectory of these emergent climate change interventions; of special concern is, for example, whether they will potentially impact fishers’ control, access and use of their coastal resources, or if these initiatives will ameliorate or reinforce social inequalities and exclusion.

7.4 Thesis Contributions

In the context of Mexico, my most immediate contribution is the critical analysis of a concept that conveys apparently straightforward ideas about (a) the need to promote practices so people become conscious of the many climate change risks they are going to experience; and (b) what people should do to face climatic changes. Although critical analysis by anthropologists and geographers has emerged during the last decades, in Mexico critical discussion of adaptation is almost nonexistent – scholars have mostly focused on politics of mitigation such as REDD (Reduced Emissions from Deforestation and Degradation) initiatives. The dissemination of preliminary findings in conferences in Mexico, among researchers working on topics such as vulnerability and adaptation, was received with surprise. In their studies, assumptions and ideas about climate change adaptation were used uncritically, as a neutral concept. This study introduces a critical perspective to Mexican scholarship, as well as contributes to the larger discussion already taking place in other contexts around the world – which has been mostly focused on Northern communities and the Small Island Developing States.

Furthermore, and as it was noted in this dissertation, the overarching research question I discussed related to the implications of using global frameworks to explain local environmental changes, is not novel. Political ecologists have examined this question in relation to a variety of topics - deforestation, desertification, soil erosion – and locations – Africa, South America. However, this dissertation's primary contributions lies in offering a

critical sociological perspective on climate change adaptation (rather than mitigation) in the Mexican context.

More specifically, I identify three contributions of my research to the field of environmental sociology. First, it contributes to sociological analysis of how environmental problems are constructed, and specifically to sociological criticism of global narratives that emphasize the existence of normative “common” interests and views on problems and their solutions (Yearly, 2002; Taylor & Buttel, 1992; Timmons & Parks, 2006). At the core of this critique is the examination of apolitical technocratic approaches to environmental problems. Taylor and Buttel (1992) explain that in global environmental discourses two allied views of politics have been privileged: the moral and the technocratic. My dissertation is based on a detailed analysis of contentious local issues related to the use, access, and management of resources and on historical struggles for fishers’ lands and marine resources with the state-own oil company. I have demonstrated how normative technocratic adaptation measures proposed in government narratives, “are distanced from the resource users” (Adger et al., 2001, p. 681). I discuss how government narratives do not account for power relations embedded in highly contentious political issues among and within coastal communities, and between actors with differentiated political and material resources. In sum, my dissertation problematizes the abstract idea of the existence of common interests and views of environmental problems and their solutions contained in global climate change narratives.

Second, my research brings into the analysis the implications of inequality in the study region. It discusses the harmful effects of development, that in the region have been translated into differentiated environmental impacts on coastal communities. In particular, my account of the political economy of local communities helped us to understand the long-term environmental changes state interventions have had on the region. Pellow and Brehm (2013) argue that “environmental sociology’s promise is to expand our understanding of inequality by making sense of the often tense and violent relationships among humans, ecosystems, and nonhuman animal species” (p. 231). This dissertation contributes to analyses on these conflicting relationships among powerful (oil industry) and less powerful human actors, as well as the differentiated impacts state projects have on the ground. Overall my research contributes to political economy perspectives on environmental sociology that have problematize “the effects of capitalism and modernity on socioecological well- being” as well as on how this system “works for the benefit of some groups and to the disadvantage of others” (Pellow & Brehm, 2013, p. 231-2).

The third contribution to the field of environmental sociology is that my research shed light on the role of states in shaping global narratives. It emphasizes states’ agency in shaping the norms, discourses and information emanating from world environmental regimes. In doing so, it criticizes accounts (e.g. world polity theories) that analyze how the climate regime constructs and propagates environmental norms, values, cultures, and how it “diffuses these models to nations, as it encourages states to adopt new environmental laws and

policies” (Pellow & Brehm, 2013, p. 234). A nuanced analysis of concrete mechanisms how state officials and agencies deal with the “climate change problem” gives us insights about global discourses’ problematic and contested trajectories as they are adopted in national or local settings.

My study also contributes to the field of development studies by identifying characteristics of an emergent narrative that conveys new goals, ideals, social representations and ways of framing existing governance problems under a climate change adaptation approach. This research critically analyzes the implications of re-oriented development narratives that frame and attempt to address what I call old unsolved development problems, now under the label of climate change adaptation. It also discusses how these narratives expose ideas characterizing what has been described as an “adaptive subject,” a subject who will be well-equipped to face climate change impacts. I discuss the anti-political nature of these development narratives that through a process of simplification render technical complex political issues.

7.5 Research Limitations

This dissertation would have been benefited from having a more comprehensive analysis of global narratives generated directly by organizations such as the IPCC. Although I use direct sources, I do not explore in depth these organizations’ assumptions and the analysis scholars have conducted of different controversies regarding the IPCC and themes such as problem definition,

conceptual definitions, and interest groups, among others. I mostly discuss these global frameworks as they have been explained by the Mexican government.

A key international actor that is also constructing a power/knowledge global regime is the World Bank (Goldman, 2005). This dissertation analyzes a climate change adaptation project financed by the World Bank in the study area. However, my research does not specifically discuss the role of the Bank in shaping adaptation narratives; neither does it analyze the Bank's interactions with national professionals, scientists and epistemic communities that are closely collaborating with this institution in constructing climate change narratives. These are in themselves research topics that would require a deep analysis of the global political economy in which the World Bank is rooted, a topic that is beyond the aim of my own research project. However, this analysis would definitely make my research much more comprehensive.

A close inquiry of how local actors, such as local or regional NGOs and grassroots organizations, take up climate change claims would have provided a more comprehensive understanding of how other types of actors relate to these global framings in different ways. This would allow me to analyze how they are appropriating climate change frameworks to make their own local claims. An example of this type of grassroots organization is the "Group of Local Communities Impacted by Oil and Climate Change" that identifies and blames governments' poor decisions – e.g. corruption and protection of hydropower private interests – among the many human factors causing the recent flood disaster in Tabasco discussed in this dissertation. They criticize narratives that

explain this disaster as a climate change impact caused by increasing rain storms. This type of organization also relies on criticisms against the corporate world and global capitalism as drivers of the climate change crisis. Finally, the pairing of climate change and oil claims is interesting since this organization blames the oil industry for building coastal infrastructure that is changing the environment but at the same time refers to sea level rise as an important climate change event that is threatening Tabasco coasts.

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