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Implementation challenges of climate change adaptation initiatives in coastal lagoon communities in the Gulf of Mexico

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Abstract

This paper explores some key challenges the Mexican government may face when implementing climate change adaptation initiatives in coastal lagoon communities in the Mexican state of Tabasco, in the Gulf of Mexico. I discuss some challenges state initiatives of this type may encounter considering the existence of local contentious political issues among various actors – fishers and the state-owned oil industry – that are at the core of the emergence of coastal environmental changes in the study site. A close analysis of local political, economic and environmental processes in coastal lagoon communities illustrates the existence of contentious issues among powerful actors over territory and its resources. It is in the context of these local, on the ground, issues that I argue that climate change adaptation interventions become highly political. I also argue that climate change policy analysis must be done in light of past and failed state interventions in Tabasco that have had a negative impact on ecosystems and fishers' livelihoods. My analysis of climate change adaptation initiatives and fishers' views on their local environmental problems is based on political ecology approaches to environmental narratives and critical literature on climate change.

Keywords: Climate change adaptation, Fisheries, Coastal communities, Mexico, Tabasco, Gulf of Mexico

Introduction

In this paper I discuss socio-environmental changes that coastal lagoon communities in the Mexican state of Tabasco, adjacent to the Gulf of Mexico, are experiencing. This analysis is made in light of climate change adaptation initiatives that the Mexican government is proposing for the Gulf of Mexico and the Caribbean Sea coasts. A core issue I discuss is the various challenges state initiatives of this type may face in the study area, considering the existence of local contentious political issues among various actors – fishers and the state-owned oil industry – that are major drivers of coastal environmental changes. I analyze fishers' immediate concerns about resource access and overexploitation, pollution, economic constraints, and lack of enforcement of fishing regulations, among others.

These issues are analyzed in the light of two adaptation measures arising from climate change initiatives proposed by the Mexican government: aquaculture and fishery planning. I argue that there is a divergence between what government initiatives

propose as being suitable strategies to face climate change adaptation, and what local fishers actually think about the problems they face and how to address them. I argue that climate change initiatives in the context of the study communities, presented as strategies to help coast populations and ecosystems to better face climatic changes, are however highly contentious. These initiatives frame local problems and propose solutions that involve resource control, access or management. In the study area there are contentious issues among powerful actors over territory and its resources. The implementation of adaptation initiatives in this specific context may face challenges if they are not designed to address local structural socioeconomic, political and environmental problems. They may also become irrelevant if they are not instrumental in solving fishers' needs beyond climate change-related problems.

I use a narrative analysis approach to discuss climate change projects, as well as fishers' explanations and understandings of environmental changes. Analysis of narratives (Roe 1995, Forsyth 2003; Fairhead and Leach 2000, 1995; Batterbury et al. 1997) highlights how particular actors understand and frame problems. In particular, I draw on political ecology approaches to environmental change narratives. Political ecology is a paradigm focused on explaining how power relations are reflected in conflicting perceptions, discourses and knowledge claims about nature (Forsyth 2003; Peluso & Vandergeest 2011; Bryant 1998). 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 and Walker 2008, 17). Particular frameworks of environmental change, scholars argue, are used to justify interventions that are imposing prohibitions, regulations and practices on local communities (Fairhead and 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.

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 and Castree 2012; Farbotko and Lazrus 2012; Hartmann 2010). My analysis resonates with these critical approaches that focus on the potential social, political and economic implications that dominant frameworks of environmental change might convey to local actors. In particular, my discussion echoes some analyses of adaptation initiatives in Mexico which point out issues of inequality and power relations, and criticize the technological approach to climate change (McEvoy and Wilder 2012; Manuel-Navarrete et al. 2011).

The case study on which my analysis is based has two important characteristics. The first is that these communities are located in a region that historically has suffered socioeconomic, political and environmental impacts from the Mexican oil industry (Buenfil 2009; Ponce and Botello 2005; Botello et al. 1983; Vázquez et al. 2002; Rosas, et al. 1983; Rodriguez et al. 1995; Town and Hanson 2001; Lezama 1987; Negrete 1984; Velázquez 1982; Allub 1985; Tudela 1989). The second is that the study site is part of an area located within a coastal wetland which is one of eight pilot sites that the Mexican government selected as part of an initiative funded by the World Bank – the *Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico* project (World

Bank 2008, 2011; Buenfil 2009). This project aims to design and implement “pilot measures that would provide information on the costs and benefits of alternative approaches to reduce [coastal wetlands’] vulnerability” (World Bank 2008, 10). In this paper I highlight how important it is that this type of adaptation planning effort recognize and address complex socioenvironmental issues, such as the ones I analyze in this paper, in the process of designing and implementing local interventions.

In this paper I focus the analysis on two adaptation measures proposed by the Mexican government in the Climate Change National Strategy (CICC 2007). Government initiatives adopt the Intergovernmental Panel on Climate Change definition of adaptation, which is explained as “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, 1758). The analysis of this paper is based on broader research in which I employed a multi-method approach: I conducted 133 in-depth interviews with government officers, scientists, and fishers, I analyzed archival materials and planning documents, and also engaged in direct participant observation. My research included one exploratory fieldwork stage (2011) and two fieldwork periods (2011–2012). The next section describes some characteristics of the study communities; section three discusses some of the most important state interventions that were implemented in Tabasco during the twentieth century. In section four I analyze climate change adaptation measures proposed by the Mexican government, and the type of local challenges their implementation may face in light of the local problems fishers discussed with me in interviews. The last part presents final remarks.

The Study Site

The case study includes five coastal communities in the Southern Mexican State of Tabasco, adjacent to the Gulf of Mexico (Fig. 1). Tabasco is located in the delta of two of the most important river basins of the country. Due to its extent and the volume of water it produces (33% of national freshwater production), this delta is one of the most important in North America (INE 2015; Mendoza et al. 2013, 120). It is a humid tropical lowland region, with extensive swamps and lagoons: 28% of Tabasco’s territory is wetland areas and 53% of Mexico’s freshwater swamps are located in this province (Barba et al. 2006). A large percentage of its territory is situated 10 m above sea level, and large parts of its coastal wetlands are located at –1 m below sea level. Approximately 30% of the territory – grazing marsh – is periodically inundated (Gama 2008, 7).

The Context

The communities that are part of this research are extremely poor and marginalized. The biggest and more urbanized community has about 1600 inhabitants, and the other four are rural localities that range between 374 and 600 inhabitants (INEGI 2010). They are located on a long barrier island that divides the sea from three continuous coastal lagoons; along the strip there are two openings – one natural and the other artificial – at each extreme end of the territory (Fig. 2).

Fishers practice small-scale artisanal fishing with small boats. In these places local fishers have virtually no alternative economic activities. There are some fishers who



have other additional temporary activities such as agriculture and livestock farming, but these productive activities were small-scale and for their own consumption. The majority of fishers exploit resources from three interconnected lagoons, but some of them – those with motorboats and nets – also fish in the sea. However, as is the case for other inland fisheries in the region, fishers also exploit resources from other environments such as estuaries, rivers, streams and marshlands (Mendoza et al. 2013).

The Carmen-Pajonal-Machona lagoon system exploited by the communities in this study is Mexico's most important oyster producer (*Crassostrea virginica*). Mexico is the sixth largest oyster producer in the world, and the Gulf of Mexico contributes 93.4% of national production (Pérez et al. 2012, 134). In the Gulf of Mexico, Tabasco is the second most important oyster producer after the neighboring province of Veracruz. In 2011, Tabasco caught a total of about 13 thousand tons of oysters (CONAPESCA 2011, 163). Fishers reported that almost all of their production went to Mexico City. Fishers organized in cooperatives exploit mainly oysters. However, other fishers also fish for shrimp, crab, clam, winkle, nook, tilapia, sea bream, sea bass, shark, and dogfish. Women's participation in fishing activities is very important; together with their children they have the main responsibility for shelling oysters.

Fishing officials reported the existence of more than 2 thousand fishers in this region.¹ However, they recognized that these numbers are not accurate since only legally registered people appeared in the data. Officially, fishers have restricted public access to the lagoons. The only people who are legally allowed to fish and market lagoon resources are the fishers who have a government permit; the only type of fishers that get permits are the ones organized into cooperatives, or private fishers. But only the cooperatives get permits to exploit oysters; private fishers have permits for other lagoon species. However, according to the fishers and fishing officials interviewed in this study, the lagoon and sea are accessed by many fishers from these and neighboring communities who do not hold any legal permit (see also Pérez-Sánchez and Muir 2003).

There are three types of fishers – members of cooperatives, private fishers, and “freelance” fishers – categories that also correspond to the stratified economic and political power these actors hold inside and outside their local communities. In the municipality, there are 32 cooperatives, and nine in the study communities. Fishers receive benefits through cooperative membership, such as government subsidies to buy boat engines, nets and gasoline. In the past they also received a subsidy during the closed season, in the form of a temporary job with a fixed subsidized salary. Private fishers are the second type. These fishers have the financial resources to buy their own equipment, boats and nets, and employ other fishers to work for them. In the municipality there are a total of 50 private fishers. They have different types of permits to fish different kind of species, and they also receive public funds and subsidies. The fishers who lack a government permit granting access to the lagoon and sea are called “freelance” or independent fishers. This group of people is most vulnerable since they usually 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.

State interventions or the historic construction of vulnerability in coastal communities 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 work of human hands to thrive and as an extensive territory to be productively used in the service of national interests (Tudela 1989; Ridgeway 2001; Arrieta 1994; Martínez 1979). Tabasco has been seen as a blank page to be filled with any imaginable potential intervention (De Giussepe 2011; Dozier 1970).

Historically Tabasco has been a locus of the Mexican government's development "experiments" that have resulted in what Tudela describes as "harmful development" (Tudela 1989; Arrieta 2006; Uribe 2010). There have been three key historical moments in the state's efforts to advance Tabasco'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 in the context of the oil boom, (iii) its positioning as one of the most important oil producing regions in the country. 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. They have reconfigured 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 terrestrial pollution, among other impacts.

In particular, in the study area, one of most important structural transformations has been the emergence of the oil industry, initiated during the 1950s but in full expansion from the 1970s after the discovery of important oil and gas fields. Mexico is one of the most important oil producers worldwide. 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, 10). In 1980 Tabasco – the "Emerald of the Southeast" – produced more than half of Mexico's total oil exports (Lezama 1987, 235). In 2013, the province was the most important offshore oil and gas producer (SENER 2013). The oil sector's contribution to the provincial economy was about 50% in 1970, and 70% in 2009 (INEGI 2009).

In Mexico, the petroleum industry is managed by the state-owned company *Petróleos Mexicanos* (Pemex, for its acronym in Spanish) created in 1938 after the expropriation and nationalization of oil companies. The oil industry (Pemex) had a radical impact on the style and quality of life of local peasants, fishers and their environment, on their economy, and fundamentally, on their social relations. The activities involved in oil exploration and drilling, and the construction of pumping stations and pipelines, fragmented the already degraded wetland ecosystems in the Gulf of Mexico (Wilson and Ryan 1997). These activities polluted fishers' water and resources and displaced peasants from their lands, by the expropriation of their lands and by the ecological damage and contamination that forced them to abandon their agriculture and livestock activities (Negrete 1984).

An analysis of the potential implications of new state initiatives, such as the climate change adaptation projects, should be done taking into account the history of policy interventions that have had negative impacts on people's livelihoods, quality of life, and environments. A critical approach to state policies in the region would necessarily question how climate change initiatives are addressing structural social, political and environmental problems that are affecting coastal communities and their water and land resources. The next section discusses some of the challenges adaptation initiatives proposed for coastal areas may face.

Climate change adaptation initiatives

Internationally, there is consensus that there is climate change, that change has already been 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, 300). To some degree, there is consensus that two courses of action are required: mitigation and adaptation.

Historically, it has been climate scientists who were responsible for talking about climate change. However, following the IPCC recognition that since the mid-twentieth century the increase in temperatures "was very likely due to the increase in anthropogenic greenhouse gas concentrations" (IPCC 2007), the topic has been taken up by social scientists, non-governmental organizations working on poverty reduction, humanitarian organizations (e.g. Red Cross), as well as the media. All these actors have brought different conceptual understandings and priorities for action. There is therefore a need to understand better the concepts they are promoting, the consequences of the use of climate change in policy discussions, as well as how these concepts and discussions lead to particular "frames" for understanding local realities. The ways these framings are applicable to understanding and intervening in climate-related stresses, crises and responses remain vigorous arenas of inquiry and debate.

In the study site, national and provincial governments have proposed climate change adaptation measures. In 2008, for example, the Mexican government initiated the project "Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico" with funding from the World Bank (World Bank 2008, 2011; Buenfil 2009). It had the goal to promote adaptation to climate impacts in eight pilot sites in the Gulf of Mexico. The coastal lagoons of this case study are part of one of eight pilot sites selected in this project, the Carmen-Pajonal-Machona Lacunar System. The project concluded its first stage in 2009, with the production of a socio-environmental diagnosis of each area and policy recommendations (Buenfil 2009). In the second stage, the aim was to produce detailed adaptation measures for each site.² Other government plans such as the National Climate Change Strategy (CICC 2007), the Climate Change Adaptation in Mexico: Vision, Elements and Criteria for Decision-making (CICC 2012) and the Tabasco Climate Change Plan (SERNAPAN 2011) are umbrella documents that discuss vulnerability to climate change impacts in Mexico. They are policy instruments with conceptual frameworks that analyze some of the country's first efforts in designing adaptation initiatives. In this paper I will focus the discussion on two adaptation measures proposed by the national government in the Climate Change National Strategy (CICC 2007).

In government narratives, adaptation is explained as “an opportunity to change paradigms and to improve the quality of life” of people (CICC 2012, 147). Adaptation is framed as a key step towards the realization of sustainable development in Mexico (CICC, 2012, 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 et.al. 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.

In the study site, 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 its oysters, and about 40% of total fish production (Cervantes and Buenfil 2009, 38).

Among the adaptation measures government initiatives propose for coastal zones are, for example, community relocation from areas affected by coastal erosion and sea level rise, aquaculture initiatives, fishery planning and the establishing of natural protected areas (CICC 2007). Specifically in my study site some of the adaptation measures proposed are, for example, 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).

In what follows I discuss two adaptation measures proposed in the Climate Change National Strategy (CICC 2007): a) aquaculture and b) fishery planning initiatives. Unfortunately, climate change initiatives are suggesting these types of measures without elaborating in depth more concrete strategies about the issues they are going to address and the mechanisms to be used to implement such projects. In what follows I analyze these strategies and the views and perspectives fishers expressed in interviews about some local issues. I argue that the implementation of such initiatives on the ground may face complex challenges if they overlook structural governance issues beyond climate change- related impacts.

Aquaculture

The implementation of aquaculture projects “to increase the supply, compensate for the loss of fishing from climate change, and to promote the restocking of wild species” is an adaptation option (CICC 2007, 118). Aquaculture is considered an alternative food-production system to compensate for the predicted negative 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, 795). According to a scientist, in Tabasco fishers are already facing important challenges such as changing water temperatures that are causing the emigration of species from the region.³ The Tabasco Climate Change Plan (SERNAPAN 2011) proposes the implementation of fish farming as an option to promote fish self-consumption and improve the production of native fish species. Aquaculture is therefore a strategy to produce and stabilize fish supply.

In Mexico, the government promoted this type of economic alternative in rural inland and 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 at the time these initiatives were framed as development and livelihood enhancement projects, rather than as a response to climate change. A government fisheries 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. The Mexican government has promoted these types of aquaculture programs in Tabasco and other regions of the country as an income and employment generation activity with the aim to reduce pressures on over-exploited fisheries (SEMARNAT 2012; Ramírez-Rodríguez 2015; Pérez-Sánchez and Muir 2003; DeWalt et al. 2002). In Tabasco and other neighboring oil producer provinces, the federal government has also provided subsidies to diversify local activities in light of the impacts that fishery and oil related legislation has had on fishers’ livelihoods (Arias-Rodríguez and Ireta-Guzmán 2009).

In the study region and in neighboring communities in Tabasco, the first efforts to cultivate oysters began in 1976 with the support of the national and provincial governments. 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 to determine suitability were the presence of oil pollution – impacts caused by oil spills and leaks that affect the land and water – and a lack of capacity to treat wastewater.

In interviews with freelance fishers and members of fisher cooperatives, two main issues regarding aquaculture projects were discussed that drew attention to the relevance of local politics, particularly corruption and struggles over space and resources. The first issue concerns social organization, corruption, fishers’ accountability, and the lack of government support. Historically, it has been the same group of privileged fishers – 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.” According to the fishers, government officials never follow up on projects’ implementation or effectiveness; fishers showed me several farming facilities that had been built but never used. Misuse of funds and lack of accountability were the main problems fishers discussed in the 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 fishers. He said: “the government wants to throw us out of the sea so Pemex can make use of it, can exploit it.”⁴ 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 fishers’ identity and the underlying power relations among fishers’ groups and organizations. The same leader stated: “we are fishers, we are not fish farmers, but the government wants us to become farmers.” He also explained that fishers have a very important role in providing fish and sea products to Mexico City, one of the largest cities in the world: “if we do not fish, who is going to provide the products to these markets? Maybe big fishing companies will replace us.”

The implementation of what in climate change narratives is explained as an “alternative” economic activity may have different meanings for certain actors. Fishers, for example, may see adaptation projects as a threat to their identity as fishers. In interviews, fishers proudly discussed the important role they have in feeding our society. Fishers shared their sense of identity when they articulated ideas about the need to overcome the socioeconomic challenges they face, so they may pass on their heritage (e.g. knowledge and resources) to their grandchildren with the aim of continuing the fishing tradition in their communities. As explained in the paragraph above, fishers do not see themselves as farmers, but as fishers. Therefore, in their view, economic activities such as aquaculture could be interpreted as a strategy by powerful forces such as Pemex to “throw” them out of the sea. Furthermore, in their experience, aquaculture is already a failed project in their communities that may not represent a positive option in the long term. This variability of meaning reflects the contentious struggle over territory and its resources, and is clearly exacerbated when adaptation projects 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 fishers’ livelihoods and power. Fishers’ 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 and Braun 1998, 13).

Finally, along with these criticisms fishers 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 fishing sector has been forgotten by the government, and that there is no clear strategy to drive this sector and make it competitive. Some of these ideas coincide with research findings on the study communities reported elsewhere (see Pérez-Sánchez and Muir 2003).

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 fishers 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 fishing production. They visualized this strategy as the only one that will help them survive the many economic pressures they face, particularly low production and prices. How this local concern fits into adaptation measures, such as 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 fishers conceive of as advantageous for them? Fishers explained that their lack of motor boats and nets have prevented them from going longer 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 private fishers who have the financial and political resources to access this type of equipment. A fisher commented “the government should provide us with motors, with only one motor 3 to 4 fishers can work”.⁵ Other issues mentioned by fishers that also reflect their interests in expanding and improving their fishing activities were their problems with the middlemen that sell their product in Mexico City.

The need to improve market strategies to raise the quality and price of the product was also highlighted. As fishers explained “we should have a better government who helps us to improve our activity and to help us to set up our own fishing company so we can sell and export our product and get a better price”.⁶ These comments illustrate fishers’ perspectives on how to improve and manage their activities. The need to expand and get better boats and motors appears to be a view against small scale “traditional” fishing.

The second adaptation measure, promoting the sustainable use of alternative species, also involves many challenges. An analysis of the underlying set of factors determining fishers’ 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 fishers’ 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 fishers’ degree of independence. Freelance fishers, for example, who are the majority of the population,⁷ need to work for private fishers, who are the ones who ultimately make decisions about when and what to fish.

The promotion of resource sustainability in this region is a challenge if we consider other factors shaping fishing activities in Tabasco. An example is the struggles fishers face, and strategies they use, to survive during the closed season (see also Pérez et al. 2012). In interviews fishers explained that for the majority of them, the only way to meet their needs is by fishing. Therefore, a key problem they face is the annual 3 month long closed season. 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 on the black market.

On the other hand, lack of enforcement of permit fishing clearly creates a problematic situation of open access where everyone can fish, legally or illegally. There is also a lack of enforcement of regulations around fishing certain species: fishers take the risk

of fishing any species they want even without a formal permit (see also Pérez-Sánchez and Muir 2003). If the authorities catch them they will report this production as a result of “chance” or accident. During the fieldwork period (2011) there was more shrimp production in the lagoon than ever before, which benefitted many fishers despite having inadequate licences to catch shrimp. Similarly, in that year there were high levels of tuna production, which led to many fishers targeting tuna without a licence. Another problem mentioned often was the lack of government oversight about the type of fishing nets fishers use.

Economic constraints, lack of technology, and subordination are only some of the underlying factors limiting fishers’ economic activities. Fishers, regardless of their status as members of cooperatives, freelance or private, face many other important challenges, such as the establishment of new fishing regulations that prohibit fishing activities close to offshore oil fields, which function as artificial reefs, so that fishers can no longer access the abundant species around them (Zalik 2009). These new conditions increase fishers’ production costs and time, because they need to go farther from the coast; they also increase their risks. The lack of access to some fishing areas illustrates struggles with the oil company over common resources and space that fishers historically used.

Finally, a key governance issue related to fishery planning is that of the socio-environmental and economic impacts of the oil industry in the region. The conflicting relationships between fishers and Pemex were a core issue discussed in the interviews. Fishers explained that their conflicts with Pemex began in 1975, when the oil industry opened an artificial connection between the sea and the lagoon. At that time, 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. The opening has had negative effects, because it transformed not only lagoon ecosystems by increasing salt water flow to the lagoons, but it also affected on 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. This problem has been openly recognized by scholars and government authorities (Bello et al. 2009; World Bank 2008). This is one among many other issues fishers discussed in interviews. In sum, it is important to point out that any initiative aiming at planning the fishery sector in these communities, may need to address contentions issues.

Concluding remarks

Analysis of environmental narratives allows us to identify the different frameworks actors use to explain local issues and solutions. In this paper I discussed some of the key local challenges government initiatives may encounter on the ground in light of some of the problems fishers discussed in interviews. The generic label of “fishery planning” as an adaptation measure, for example, may represent for fishers a whole array of governance issues that are beyond the actual political will and capacity of authorities and international agencies to address. Scholars have criticized these types of adaptation initiatives as Band-Aid solutions that do not address structural issues. 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). The two examples of so-called adaptation measures that I analyzed – aquaculture and fishery planning – raise different challenges that have intersecting and complex political, economic, cultural, and environmental dimensions that are not currently considered in the government’s field of vision when they define the climate change problem.

A narrative analysis approach questions whether government initiatives, and the frameworks it uses, address local contentious issues related to resource access, management and control in coastal communities; it looks at how these initiatives take into account structural political and environmental issues that are at the core of the emergence of environmental changes in coastal areas. It questions also the type of strategy governments and international agencies are going to apply to conciliate fishers’ interests, ecosystems conservation measures and oil industry activities in the area. The oil industry is a key strategic economic sector, as fishers indicated in the interviews. It is also, however, the main source of local environmental and economic vulnerability for them and their ecosystems. This industry is also a direct and indirect source of greenhouse gas emissions that are generating climate change in the first place.

I have argued in other analysis (Vázquez 2014) that government initiatives that are presented as neutral to address climate change impacts, and will help people and coastal ecosystems, are however highly contentious since they have to do with resource use, control and access. A close analysis of social perceptions of local environmental changes, and the controversies around some issues, illustrates that efforts to position climate change may be a contested process on the ground. 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.

Endnotes

¹Interview with government local fishing official from the Ministry of the Environment. June 8, 2012. Tabasco.

²Interview with a private consultant who collaborated in the project. June 29, 2012. Mexico City.

³Interview with a scientist from a regional research institute in Villahermosa, Tabasco. December 12, 2011.

⁴Interview with a local leader. December 21, 2011. Tabasco.

⁵Interview with a fisher, Tabasco. December 20, 2011.

⁶Interview with a fisher, Tabasco. December 21, 2011.

⁷In the interviews fishers and fishing authorities explained that this type of fishers represent the majority of the population from the study and surrounding communities. Since they are “illegal” fishers, there is not official data to estimate their number.

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Ethics approval for the study was obtained from York University's Research Ethics Board, Toronto, Ontario. Research participants provided verbal consent to participate in the study.

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Not applicable.

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