

**Private Hydropower and the Politics of Nature in  
Mexico's Sierra Madre Oriental**

by

**Noah Silber-Coats**

---

**A Thesis Submitted to the Faculty of the  
SCHOOL OF GEOGRAPHY AND DEVELOPMENT**

**In Partial Fulfillment of the Requirements**

**For the Degree of**

**MASTER OF ARTS**

**In the Graduate College**

**THE UNIVERSITY OF ARIZONA**

**2015**

## STATEMENT BY AUTHOR

This thesis has been submitted in partial fulfillment of requirements for an advanced degree at the University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this thesis are allowable without special permission, provided that an accurate acknowledgement of the source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

SIGNED: Noah Silber-Coats

## APPROVAL BY THESIS DIRECTORS

This thesis has been approved on the date shown below:

\_\_\_\_\_  
Diana Liverman  
Regents' Professor  
School of Geography and Development

August 28, 2015

\_\_\_\_\_  
Carl Bauer  
Associate Professor  
School of Geography and Development

August 28, 2015

## **Acknowledgements**

Doing qualitative research of this kind depends entirely on the willingness of the “research subjects” to share their knowledge, thoughts, and emotions with a complete stranger. For this reason, I want to thank everyone in Mexico who took the time to talk with me, fed me tortillas and mole, and invited me into their lives. Since most of those most deserving of my gratitude are mentioned in these pages under pseudonyms, I will not mention any names.

The support and assistance of CEMDA was instrumental to completing this project, and for the introduction to this organization I am grateful to Margaret Wilder. Each of my committee members – Diana Liverman, Carl Bauer and Jeff Banister – provided valuable insight and feedback during fieldwork and writing that helped shape this document. All of my fellow graduate students at SGD deserve credit for making this a positive and engaging environment. In particular, my cohort-mates Emma Lawlor and Casey Lynch have provided excellent feedback and moral support throughout the process. Finally, I want to thank my partner, Willa Ahlschwede, and my parents for their love and support.

## Contents

Abstract.....	8
Introduction.....	10
Methodology.....	18
Plan of the Thesis .....	20
Chapter 2 - Towards a Political Ecology of the Water-Energy Nexus.....	22
Environmental Governance .....	22
Immanent Environmental Governance.....	24
The Object(s) of Environmental Governance.....	25
The Politics of Technology.....	29
Hydropower and the Hydrosocial Cycle .....	31
Hydropower and Energy Geographies .....	34
Chapter 3: Hydropower Development - From High-Modernism to Neoliberalism .....	37
Act 1: Rivers and Modernity .....	37
Act 2: Breakdown of the Hydraulic Mission? .....	39
Dam Impacts as Matters of Concern .....	41
Act 3: Resurgent Hydropower.....	44
The Rise of Small Hydro .....	47
Chapter 4 – Hydro-History in Mexico: Capital, Hydrocracy and ‘Public Utility’ .....	51
From Revolution to Nationalization.....	56
Neoliberal Reforms.....	61
Small, Private... Renewable? The Changing Face of Hydropower in Mexico.....	67
Chapter 5 - The Bobos-Nautla: Making Space for Hydropower .....	73
Grand Schemes and Local Dreams: Early Hydropower in the Bobos-Nautla .....	76
Fragmented Hydropower Planning and the Production of ‘Magic Numbers’ .....	84
Which Government? The Contradictions and Ambiguities of Environmental Permitting and Regulation.....	87
Part 1: Clearing the Path.....	90
Part 2: Complications .....	94
Chapter 6 - Hydropower and the Politics of Nature in the Bobos-Nautla: .....	100
Group Formation in Uneven Terrain.....	100
Hydropower, Conservation and Property: The River Has No Owner? .....	103
Forming a Movement, Performing the Basin .....	108
No One Knows Who They Work For: Hydropower on the Jalacingo .....	116
Flow Politics: Divergent Water Narratives .....	121
<i>Caudal Ecologico</i> : Defining Minimum Flows, Constructing Abundance .....	122
Scarcity, Change and Suffering: Local Water Knowledge.....	125
Springs, Water Committees, and Hydropower Politics.....	130
Epilogue and Conclusion .....	135
Appendix A: Table of Hydropower Projects in Bobos-Nautla Basin.....	144
References.....	146

## List of Figures

1. Graph of permits for private hydropower.....	68
2. Map of private hydropower projects.....	72
3. Photo: Intake for Tlapacoyan’s water supply.....	77
4. Map of concessions for hydropower in Bobos-Nautla basin, 1924.....	80
5. Map of “Minihydroelectric Potential of the Gulf Region.”.....	86
6. Map of proposed hydropower projects in the Bobos-Nautla.....	87
7. Timeline of Hydropower in the Bobos-Nautla.....	99
8. Photo: Alianza members protest at a campaign rally.....	104
9. Photo: Meeting in Mecacalco.....	115
10. Photo: landslide near Jalacingo River.....	118
11. Photo: A spring in a rural community near Atzalan, Veracruz.....	127
12. Photo: A <i>comite de agua</i> at the intake for their water supply. ....	129

## List of Acronyms

- AMEH - Asociacion Mexicana de Energia Hidroelectrica (Mexican Association of Hydroelectric Energy)
- ANT - Actor-Network Theory
- CDM - Clean Development Mechanism
- CEMDA - Centro Mexicano de Derecho Ambiental (Mexican Center of Environmental Law/Rights)
- CFE - Comision Federal de Electricidad (Federal Electricity Commission)
- CNI - Comision Nacional de Irrigacion (National Irrigation Commission)
- CNFM - Comision Nacional de Fuerza Motriz (National Commission of Motor Force)
- CPNA - Coordinador Plan Nacional de Ayala
- CONAE - Comision Nacional de Ahorro de Energia (National Energy Saving Commission)
- CONAFOR - Comision Nacional Forestal (National Forestry Commission)
- CRE - Comision Regulador de Energia (Energy Regulatory Commission)
- CONAGUA (CNA)- Comision Nacional de Agua (National Water Commission)
- DGIRA - Direccion General de Impacto y Riesgo Ambiental (General Directorate of Environmental Impact and Risk)
- DGPAIRS - Direccion General de Politica Ambiental e Integracion Regional y Sectoral (General Directorate of Environmental Policy and Regional and Sectoral Integration)
- IFI - International Financial Institution
- INI - Instituto Nacional Indigenista (National Indigenous Institute)
- IRN - International Rivers Network
- LAERFTE - Ley para el Aprovechamiento de Energias Renovables y la Financiamiento de la Transicion Energetica (Law for USE of Renewable Energy and Energy Transition Finance)
- LAN - Ley de Aguas Nacionales (National Water Law)

LAVIDA - La Asamblea Veracruzana de Iniciativas de Defensa Ambiental (Veracruz Assembly of Environmental Defense Initiatives)

LSPEE - Ley de Servicios Publicos de Energia Electrica (Law of Public Service of Electric Energy)

MAPDER - Movimiento Mexicano de Afectados por las Presas y en Defensa de los Rios (Mexican Movement of Dam-Affected People and in Defense of Rivers)

MIA - Manifestacion de Impacto Ambiental (Environmental Impact Statement)

MW – Megawatts

NGO - Non-Governmental Organization

OET - Ordenamiento Ecologico del Territorio (Ecological Ordering of Territory/Environmental Planning)

PEMEX - Petroleos Mexicanos

PIDIREGAS - Proyectos de Infraestructura Productiva con Registro Diferido en el Gasto Publico (Productive Infrastructure Projects with Deferred Registry in Public Spending)

PRI - Partido Revolucionario Institucional

PT - Partido del Trabajo (Labor Party)

SAF - Secretaria de Agricultura y Fomento (Secretariat of Agriculture and Foment)

SEDEMA - Secretaria de Desarrollo y Medio Ambiente (Secretariat of Development and Environment - State of Veracruz)

SEMARNAT - Secretaria de Medio Ambiente y Recursos Naturales (Secretariat of Environment and Natural Resources)

SRH - Secretaria de Recursos Hidraulicos (Secretariat of Hydraulic Resources)

TVA - Tennessee Valley Authority

UGA - Unidad de Gestion Ambiental (Unit of Environmental Management)

WCD - World Comission on Dams

## Abstract

This thesis concerns a boom in hydropower development in the central Mexican state of Veracruz. There has been a recent resurgence in hydropower globally, re-framed as clean energy and financed by private investors. Along with this, there has been a surge of interest in small hydropower, which is presented as more sustainable than large dams. Focusing on one river basin, the Bobos-Nautla where numerous small/private hydropower projects are currently being contested, I seek to understand how the trajectory of this process is shaped by (re)configurations of actors and institutions at multiple scales, and how this leads to particular places being constructed as sites of development.

My theoretical approach draws on environmental governance, political ecology and Science, Technology and Society (STS), to build a framework for answering these questions. In order to contextualize the conflicts that are at the center of this research, I first consider the historical background of dam conflicts, both internationally and with a focus on Mexico. In the latter part, I trace the history of the electric industry in Mexico, its connections with water governance and the way that authority over rivers has been redefined through this process.

Turning to the Bobos-Nautla river basin, I begin by following the history of hydropower development in these rivers, showing the numerous parallels between conflicts in the early 20<sup>th</sup> century and the current moment. I then follow the politics of environmental regulation surrounding the currently contested projects, arguing that defining what counts as protecting nature is a key terrain of struggle. In the final chapter, I look at the contested impacts of development on river flows and springs that supply water to rural communities, contrasting a narrative of untapped abundance espoused by project proponents with a narrative of scarcity and depletion advanced by opponents.

Ultimately, I argue that these projects are planned in a way that systematically ignores their potential impacts and sidelines the communities most directly affected by them. But I end on a hopeful note, arguing that the shift to small/private hydropower provides opportunities for a different approach, even if currently the one being followed favors an extractive model of development.

## Introduction

In August 2014 I stopped in Altotonga, Veracruz, a small city on the edge of the Mexican *altiplano*, surrounded by the mountains of the *Sierra Madre Oriental*. I was en route back to the state capital of Xalapa after several weeks following the politics of planned hydropower projects in this area - specifically, in a river basin called the Bobos-Nautla. Though relatively small, the Bobos-Nautla is spectacular, dropping precipitously from the lush mountains of the *Sierra* to the Gulf of Mexico and forming torrential rivers that are now attracting intense interest for their potential to generate electricity.

I had tried to reach a contact in the municipal government of Altotonga previously, but found him absent. Hoping for better luck, I walked into the *Palacio Municipal* and navigated my way to the office of Ecology and Environment. There I found Manuel<sup>1</sup>, who despite my unannounced arrival, seemed to be expecting me. “So, you’ve come to ask about our nature reserve, right?” Not wanting to misrepresent myself, I clarified that my research concerned the “*hidroelectricas*” that were planned in the municipality. Gesturing a colleague into the office, he continued to speak in exaggerated tones about the nature reserve, then quietly told me that we couldn’t have this conversation in the office because “the walls have ears.”

After hurriedly relocating our interview to the nature reserve on the edge of town - a lovely park with a pine forest and a clear stream fed by a warm spring - Manuel and two colleagues opened up about the hydropower projects. Because the official line of the Municipal government was of support for the projects, they were not allowed to voice their

---

<sup>1</sup> All names have been changed

opposition. As they began to explain the situation, the conversation moved seamlessly between political deals, energy policy, land tenure, environmental change, and rural livelihoods. Amid this dizzying narrative a startling detail emerged. Someone - Manuel referred to him as a *vendepatrias*, a “nation-seller” - had been buying up land along the Alcececa, a tributary of the Bobos-Nautla that runs through Altotonga, for what was rumored to be a series of six hydropower projects. Having spent months tracking down details of projects in this basin, this was the first I had heard of any activity on the Alcececa. As I pressed for more information, Manuel’s colleague conceded that it was only a rumor, but, he added poetically, “if the river makes a sound, it must be carrying water.”

—

The rush to develop hydropower on this river in Veracruz is part of a broader trend. In a recent report from the Stockholm Environment Institute (Escobar and Clark 2011), hydropower is said to be “the best way to meet growing energy requirements” in Latin America. Throughout the Global South, a new wave of investment in hydropower is currently unfolding (e.g. Moore et al 201; Hutchinson 2015), and the consequences of this for resource management, rural livelihoods and patterns of industrial and urban development have yet to be fully explored.

However, as the opening vignette indicates, I entered the scene in Altotonga at a moment when, even as a number of forces and interests seem to be converging to re-make the Bobos-Nautla River as an engine of hydroelectricity, the outcomes of this process are still emergent and uncertain. Plans are being formulated by engineers and reviewed by government agencies, capital is being mobilized by investors, land titles are changing hands and - in some cases - bulldozers and trucks are making their way to construction sites in

remote canyons. Meanwhile, information and rumors about this activity circulate among rural communities and networks of activists and intellectuals seeking to detain these projects. Whether they will actually be completed -and what effects they will have on communities and ecosystems -is not yet clear, but the proposed projects are highly contested. Furthermore, dams often follow a long and twisted path on the way to construction - projects that seem inevitable at one moment are suddenly canceled, while previously forgotten projects can suddenly spring back to life.

Beginning with this moment of uncertainty, then, the central guiding question for this research is: How is the trajectory of hydropower development in particular socio-ecological contexts shaped by (re)configurations of actors and institutions at multiple scales? As a corollary to this, I seek to understand how and why particular places become constructed as sites of hydropower development and how this construction is contested. If these questions seem broad, they are intentionally so, for reasons that I will attempt to clarify.

First, I am seeking to avoid privileging one particular site or actor as the driving force in this equation. I am not asking, *a priori*, about the role of the state, calculations made by investors, or the resistance posed by social movements. Each of these is important, to be sure, and they will all figure prominently throughout. The deployment of state authority to facilitate private investment, ownership of rivers, electricity markets and roadblocks (both literal and metaphorical) that halt construction - a preliminary and partial list that will only grow as we proceed - are *all* part of determining how and whether abstract “energy requirements” become instantiated as new “plumbing” in a river basin. What I am concerned with here is how different visions of what a river is and should be, and who has the authority to decide, are negotiated among these different actors with their diverse rationalities and

interests.

Implicit in the way I have framed this is an attempt to provide a symmetrical treatment of the actors, institutions and processes that promote hydropower development and those that oppose it. This impulse is informed, again, by the uncertainty of the current conjuncture in the Bobos-Nautla. What seems clear is that *something* has created the conditions that make a boom in hydropower projects possible in this place, while at the same time something else is working to destabilize these conditions before that possibility can be realized. I use the word “thing” here intentionally, in the sense advocated by Latour (2004) meaning a gathering of heterogeneous elements<sup>2</sup>. This is to say that the forces at work on both sides of this struggle are assemblages of people, laws, existing infrastructure, and bio-physical nature - again, a list that will only multiply. Although I have referred to actors above, my use of this fraught term is meant to be more in line with the Latourian conception that ascribes agency to non-humans as well as humans. As I will argue, written reports, maps and pipes are all constitutive of the politics of hydropower in the Bobos-Nautla.

While I am considering the tension between efforts of different groups to bring this boom to fruition and those that seek to stop it in its tracks, I do not mean to suggest that there are simply two sides to this conflict. As Conca (2006) has observed, dam conflicts are characterized by a “typical” array of actors engaging in “increasingly ritualized” performances of contestation. In one sense this is undeniable - the networks of both engineers, technocrats and financiers pushing for hydropower development and those of activists, affected communities and their allies have become increasingly globalized, and the terms of debate have become increasingly entrenched. A narrative that pits disenfranchised

---

<sup>2</sup> See Carroll (2012: 497) on the etymology of this usage, which is traced to Heidegger.

“local communities” as defenders of “tradition” and “nature” against those who promote dams under the banner of “progress” and “development” is all too readily available and tempting to reproduce (see Murray Li 2000).

At times, my own account will veer into this territory for one of two reasons. The first is that in many ways it does fit - hydropower development in the Bobos-Nautla *does* portend a shift in resource control that dispossesses customary users for the benefit of distant, more powerful actors, and this should not be discounted. The second reason is that this narrative is reproduced by the actors themselves, as when opposition groups connect this case to a pattern of dam-building and state violence, or when a government official accuses those groups of “standing in the way of progress.” The trick here is to distinguish between my own analysis of the situation and the all-encompassing narratives – what Latour (2005) calls “panoramas” – offered by many of these actors. Drawing on multiple accounts of who wields authority, and who stands to benefit from or bear the cost of these projects, the division of the conflict into two sides begins to break down. State agencies are multi-faceted, as are communities, NGOs and social movements. Following the various divisions and alliances that form between these actors, what begins to emerge is a picture of the “micro-political ecology” (Horowitz 2011) of hydropower development. That is to say, their positions are ambivalent and sometimes contradictory.

In what ways, then, does this case follow established patterns and in what ways does it differ from a “typical” dam conflict? In the Mexican context, there are two important distinctions that distinguish the projects planned in the Bobos-Nautla - and other rivers in the surrounding region - from previous hydropower development. First, these projects would be built and operated by private investors, a major shift after decades of centralized, state-led

energy management. Thus, the role of many different actors and their relationship to one another is in flux. A pair of questions may be raised here. In what ways do the actions of state agencies, and the legacy of state planning, continue to influence privatized hydropower development? And, from the perspective of opposition movements, where should resistance be directed and what tools are effective in this changing context?

Second, the institutional arrangements that have made this shift possible have also made private hydropower synonymous with “small” hydropower. The details of the relationship between state planning/regulation, private capital and categorization of technology will be elaborated in a later chapter. For now I will simply point out some of the key implications of these changes.

While the details of any particular project vary, small hydropower in this context generally means that instead of a dam and reservoir design (impoundment), part of a river’s flow is diverted into a tube that runs down a steep slope to build the “head” that generates power. This technical distinction does important political work. On the one hand, proponents cite this as evidence of the minimal impact that these projects will have - instead of damming a river, they would merely divert an insignificant portion of the flow and discharge it downstream. Opponents, on the other hand, see this differently. In their view, rivers are literally being stolen as they are sucked into privately owned machines, desiccating the surrounding ecosystem. Whether one of these visions is closer to the truth is not the point. What I want to argue is that they are each underpinned by a different way of knowing and valuing nature, which closely resemble the distinction between what Brown and Ingram (1987) called commodity and community views.

Immediately, there is an apparent difference between this situation and conflicts over

large dams. At least for the past few decades, it has been impossible to deny that dams have significant environmental consequences. Debates were often framed in terms of whether those costs were outweighed by supposed (usually economic) benefits. In this case, however, arguments for and against the projects are *both* articulated as environmental concerns. This dovetails with observations about the changing politics of hydropower globally as projects are re-framed as clean energy (Fletcher 2010). But the environmental politics of hydropower in the Bobos-Nautla are not only framed as a scalar question that pits local impacts against the regional/national/global benefits of reducing emissions. Claims both for and against these projects are made with reference to local environmental benefits, invoking the tropes of sustainability and conservation. Thus, I see “the environment” as a key terrain of struggle in this conflict, one that is simultaneously about material control of resources and about how nature is defined, known and valued.

One additional point about the Mexican context lends this particular conflict a unique character. The shift to private ownership and the boom in small hydropower bears a striking resemblance to hydropower development that took place around the turn of the 20th century, prior to the Mexican Revolution. Unraveling this history has led me to look at how the relationship between state bureaucracy, discourses of the nation, and property relations have shaped and been shaped by conflicts over hydraulic infrastructure over time. The key here is that property rights pertaining to rivers, which play a crucial role in the current conflict, have been shaped by this long history of hydropower development.

Although I have noted here some of the particularities of the Mexican context and of my case study, I also want to emphasize that this situation is not entirely unique. Private capital plays an increasingly important role in hydropower across the globe, and the lack of

an institutional framework for private projects is also not uncommon (Jaccard et al 2011). Likewise, small hydropower has flown under the radar as a “cost-effective and environmentally benign” technology (Bakis 2007). But with plans for this type of project ramping up in a number of places, questions about how decisions are made, who benefits from them, and how and why they are contested, should be asked. The broader significance of this research, then, emerges from the relevance of this case to many other similar situations.

While I take great pains throughout this thesis not to erase the uncertainty and ambivalence about what these projects mean for different actors, in order to avoid burying the lead, let me state at the outset some conclusions about the politics of small-private hydropower in Mexico and their potential broader relevance. First, the institutional arrangements in this case favor an extractive model of development that disenfranchises communities while enriching investors. In part, this is because of the articulation of privatization and de/re-regulation with a legacy of centralized infrastructure that allows these projects to operate as drivers of industrial and extractive development in distant sites. Potential impacts to ecosystems and on water use for human consumption are systematically ignored or brushed aside by companies and regulators. These projects cause divisions within and between communities, and the threat of violent coercion against those who oppose them is ever present. For those familiar with the history of dam conflicts, a story of corruption, violence, dispossession and environmental degradation may seem all too familiar. But the point I wish to make is that, particularly in the case of small hydropower, this could be otherwise. Claims of minimal impact should be carefully examined, but they are not baseless; small hydropower *can* have much less impact than a large dam, and there is no inherent

reason that this technology could not be implemented in a way that equitably distributes benefits and minimizes negative effects. What I see in this case, however, is a policy framework that encourages speculation and favors maximizing profits rather than balancing a plurality of needs and values. The question to ask, then, is what allows this situation to be perpetuated and what could be done to re-direct it?

### Methodology

This research is based primarily on fieldwork carried out between June and August, 2014. I conducted semi-structured and informal interviews with activists, current and former officials from a variety of government bodies, other actors involved in some way in hydropower planning (e.g. an environmental consultant and a representative of an environmental NGO), and residents of communities near planned projects. I also engaged in participant observation with a social movement organizing against hydropower in the Bobos-Nautla, attending numerous internal strategy meetings and organizing events. I collected documents, usually in digital form, pertaining to the projects in this region which include environmental impact statements and permits for sale of energy. In addition to these publicly available documents I also requested numerous files from the Mexican government via an online public records request system (Infomex). This has been particularly fruitful for getting a hold of plans and studies of hydropower potential and lists of active permits. Finally, I also spent four days in the *Archivo Historico del Agua* (Historical Water Archive) in Mexico City, where I searched for files pertaining to locations within the Bobos-Nautla basin. To my surprise, I found that the traces left in the archive for this region are almost all about conflicts over hydropower development in the first decades of the 20th century.

In a way, my methodological approach resembles the notion of “progressive

contextualization” (Vayda 1983), the idea of beginning with local (inter)action and tracing its causes and effects outward. My time in the field followed a trajectory that lends itself to this approach - almost immediately upon arrival in Xalapa, I accepted an invitation to accompany an activist to the Bobos-Nautla region where I learned about the hydropower projects from the ‘local view.’ I then tried to trace what I was finding there - for example, reports of land deals like the one mentioned in the opening vignette - to other sites: municipal government buildings in regional centers and government offices in Xalapa.

But the idea of progressive contextualization will only take us so far in this case. Unlike Vayda’s example - peasants cutting down trees in Indonesia - the action surrounding hydropower projects never has even a veneer of appearing ‘purely local.’ An array of contexts were immediately on offer to explain the causes and effects of hydropower development. Returning once more to the opening scene, this can be illustrated by the following exchange. Manuel at one point suggested that the boom could be traced to energy reforms in the 1990s. His colleague interjected, “no, the real problem is [unequal] land tenure.” In other interviews, informants would point to what they saw as the “real problem” – human rights, water rights, deforestation, poverty, and so on. How can these very different explanations be disentangled? Here I find the methodology of Actor-Network Theory (ANT) as outlined by Bruno Latour (2005) particularly useful.

Latour proposes a way of thinking about scale that unsettles the idea that local action can be explained by reference to ‘higher scales.’ Instead of thinking of the regional, national and global ‘contexts’ as exerting some force on the local by virtue of being ‘bigger,’ he emphasizes that *every* site is local – the office of a federal bureaucracy as much as a peasant’s field. The task of analysis then becomes to understand the practices of actors in,

and to trace the connections between, these sites. At the same time that he calls for ‘localizing the global,’ Latour also sees any apparently local interaction as a convergence of action emanating from many different sites and at different times. This toolkit provides a useful way of thinking about the concatenation of laws, plans and decisions that have converged to make the Bobos-Nautla a site of hydropower development at this moment. So, for instance, the conflict between hydropower companies and urban water users that I detail in chapter 4, is shaped by infrastructure built more than a century ago, previous iterations of development plans, calculations made by investors and strategic decisions of a national NGO.

Latour’s version of ANT offers a way to approach context that is very different from ‘progressive contextualization.’ Instead of ‘jumping’ to a context for explanation, his motto is to ‘follow the actors.’ As he argues, “framing things into some context is what actors constantly do...it is this very framing activity...that should be brought into the foreground...” (Latour 2005: 186). I take this insight as a guide for the account that I offer in the following chapters. The way that different actors frame what the ‘real problem’ is, the accounts that they offer about who wields authority, and the different ways that they see nature and technology are not erased but brought into conversation with one another. My methodological orientation, then, follows Latour’s call to “move between frames of reference” (2005:12).

### Plan of the Thesis

In the following chapter I outline a theoretical approach that draws on literature on environmental governance, political ecology and Science, Technology and Society (STS). My aim is to develop a way of approaching hydropower that attends to its multiple

dimensions - as energy infrastructure, as water technology, as a problematic of governance that is at once social and natural.

Chapters three and four are of a piece, each tracing the history of dams and hydroelectricity. Chapter three provides general background on the history of this technology, tracing its rise as an emblem of development, contentious debates about its impacts and the recent resurgence of investment. Chapter four follows this history in the Mexican context. My focus here is on uncovering the relationship between different economic and bureaucratic interests, following the property relations and legal concepts that have emerged in the context of hydropower development and how these continue to shape contemporary debates.

Chapters five and six are also a natural pair. Here I draw explicitly on interviews, observations and archival material collected during my fieldwork. These chapters focus on the politics of hydropower development in the Bobos-Nautla, looking first at on the formal bureaucratic processes - planning and permitting, and legal challenges - that play a role in shaping the emergent boom in hydropower there (chapter 5). In chapter six I focus on the informal politics of these projects, in particular how they are contested by social movements and communities. In both of these, I argue that the key points of contention have to do with defining nature, negotiating the question of what it means to defend the environment and who is able to make claims to do so.

In the concluding chapter I reflect on the implications of this case for the future of hydropower development in Mexico and within the context of global changes in this sector. Here I consider some possibilities for future research as small, private hydropower continues to expand into remote territories.

## Chapter 2 - Towards a Political Ecology of the Water-Energy Nexus

Conflicts over hydropower development are at once about water, energy and the environment. At the same time, these conflicts are at once institutional, political, economic and cultural. Dams can be seen as ‘socio-natural hybrids’ that internalize bio-physical processes, material and cultural practices, social relations, discourses and ideologies (Swyngedouw 1999). Faced with a boom in hydropower projects, my goal in this chapter is to develop a conceptual toolkit for uncovering the conditions that have made this moment possible (cf. Bakker 2012). I begin by approaching this boom as a question of environmental governance. Responding to the question ‘governance of what?’ (Perreault and Bridge 2009), I focus on the thing itself - hydroelectric infrastructure. But conceiving of these things as hybrids means that this focus is merely a starting point for unraveling the network of relations in which they are enmeshed. After outlining my approach to environmental governance, I draw on literature from Science Technology and Society (STS), the political ecology of water and energy geographies to develop a framework for thinking about these connections.

### Environmental Governance

Environmental governance is a term that has been deployed in many different ways. Despite the risks of analytical slippage and de-politicization, this concept - particularly as it has been refined by geographers and political ecologists - can still be mobilized in useful ways. In this section I unpack the concept of environmental governance and use it to develop a framework for thinking about hydropower development in Mexico.

A useful starting point for defining environmental governance is Lemos and Agrawal's (2006: 298) formulation of "the set of regulatory processes and organizations through which political actors influence environmental actions and outcomes." Broadly, a focus on governance indicates a concern for how decisions are made and how they are shaped by institutions - understood as laws, norms and rules (Bakker 2010, in Perrault 2014; Reed and Bruyneel 2010). Environmental governance is best understood as an analytic toolkit that focuses on institutional configurations of the state, law, markets and civil society in relation to resource management, and the outcomes that these produce (Perrault 2006; Perrault and Bridge 2009). Studies in this vein have devoted much attention to how resource management has been re-structured under neo-liberal and post-Fordist regimes, the increasing prevalence of non-state actors, and the changing role of the state in this context (ibid; Lemos and Agrawal 2006).

As many critical scholars have observed, there is a tendency for governance to be deployed in a prescriptive, managerial register that obscures the way that politics, ideology and economic interests shape the institutional arrangements that are framed as 'good governance' (Bridge and Perrault 2009; Perrault 2014). Such policy-oriented approaches, with their concern for "tackling" environmental problems (Newell et al 2012: 366), risk overlooking the power dynamics that always inhere in governance. Challenging this 'toolkit' approach, Castro (2007: 98) suggests that governance be thought of as a process of debating alternative futures through "substantive democratic participation." I would argue that this orientation does not go far enough in interrogating the power relations that shape who gets to participate and in what ways. Rather, my approach follows Perrault and Bridge's (2009: 492) call to think of environmental governance as "the reflection and projection of economic and

political power via decisions about the design, manipulation and control of socio-natural processes.”

### Immanent Environmental Governance

In one of the few critical reviews of the use of environmental governance, Perrault and Bridge (2009) disaggregate the literature in a number of ways that are helpful in delimiting my use of the concept. They suggest that a distinction be made between approaches that see governance as *intentional* and those that understand it as *immanent*. The key distinction, then, has to do not only with making room for politics, but in how causality is conceived. Even if we reject the notion of a “unitary manager” and consider instead “the articulation of a range of actors” (ibid: 477), the concern with decision-making that is so central to governance leads easily to a habit of mind that suggests that socio-natural outcomes are determined the plans and decisions of rational actors. If we shift instead to thinking about environmental governance as immanent, a much more nuanced view of decision-making can emerge.

Immanence can be understood as “a philosophy of becoming in which the universe is not dependent on a higher power” (Connolly 2010: 63). In this way of thinking, causality is seen as *emergent* rather than efficient. As Connolly explains, rather than thinking of one billiard ball moving another in a predictable fashion (efficient causality), emergent causality is “a mode in which new forces can trigger novel patterns of *self-organization* in a thing, species, system or being” (ibid: 64). Returning to Perrault and Bridge’s (2009) framing of environmental governance, we can still interrogate decisions that purport to ‘design, manipulate and control’ socio-natural processes, but we must be careful not to assume that these decisions lead to outcomes in a predictable manner. So while investors, engineers,

bureaucrats, and social movements - among a potentially endless list of actors - all may be making decisions that seek to manipulate rivers and their relationship to people, in an emergent/immanent frame, governance is not simply an aggregate of those plans mapped onto a field of pre-given power relations. Rather, power relations and socio-environmental outcomes *emerge* from the interaction of these strategies.

The challenge here is that strategies may be intentional - a plan developed by a state agency that identifies potential hydropower projects in a river basin, for example, is not an involuntary and unconscious 'strategy of power' in the Foucauldian sense (Herodote 2007 [1977]: 24), but a deliberate act meant to induce a particular outcome. But the interaction of multiple strategies may lead to novel socio-ecological formations that cannot be predicted or controlled by any one actor.

Thought of in this way, environmental governance resembles what Krause (2014), drawing on the work of John Law, refers to as 'heterogeneous engineering,' which refers to the practices of disparate actors seeking to order the world in a particular way - in Krause's case, as in mine, to either stabilize a set of conditions that make a dam possible or to avoid its construction. Also helpful here is Bruno Latour's (2005) understanding of agency and action. His assertion is that no one ever acts alone, but that every intentional act is 'barged in on' by a multitude of other actors that divert the course of action. Action - and I would assert, governance - "should be felt as a node, a knot, and a conglomerate of many surprising sets of agencies that have to be slowly disentangled" (Latour 2005: 44).

### The Object(s) of Environmental Governance

Teasing apart the disparate theoretical orientations that have been brought to bear on environmental governance, Perrault and Bridge (2009) suggest that a key distinction lies in

how scholars have defined the ‘object’ of governance. My approach draws on several elements of this typology, which I elaborate below. After situating my study within this framework, I will reconsider how the object of environmental governance is defined. While Perrault and Bridge consider the object of governance as synonymous with a central ‘problematic’ - defined as a question of scale, participation, or regulation, for example - the object of environmental governance is sometimes defined, perhaps more intuitively, as a resource (e.g. Paavola 2007). Conceiving of resources as a set of relations, rather than discrete entities, I propose to take hydropower projects (understood as socio-natural hybrids) as the object, and use them as an entry point for excavating the many connections that form around them.

My approach to environmental governance draws on three of the six ‘objects’ outlined by Perrault and Bridge: scale, political participation, and (re)regulation. As a problematic of scale, scholars have focused on processes of re-scaling - the emergence of ‘multi-level’ mechanisms that enroll a variety of state and non-state actors, such as NGOs and trans-national advocacy networks in resource management (Lemos and Agrawal 2006). Particularly salient here is the trend of re-scaling governance to the river basin or watershed scale. While framed as a ‘natural’ space that will lead to more ‘holistic’ environmental management, the creation of institutions that operate at this scale is far from value-neutral and has political consequences (Cohen 2011; Vogel 2012). Scale should be understood not as pre-given, but as produced and contested through these ‘hybrid’ governance arrangements (Bulkeley 2005). As I will discuss in the following chapters, a number of recent shifts in governance in Mexico have sought to re-scale decision-making to the river basin. Drawing on the historical work of Aboites (1998), who shows how the concept of the river basin in

Mexico emerged in the context of hydraulic infrastructure development in the late 19th century, I will argue that the scale of the river basin is (re)produced in contemporary conflicts over hydropower as actors contest and negotiate the meaning of this space and their role within it.

The second problematic draws attention to the increasing prevalence of modes of governance that establish new mechanisms of political participation, such as public consultation and ‘corporate social responsibility’ programs related to extractive industries (Perrault and Bridge 2009). Efforts to foster participatory governance often coincide with privatization of formerly state-owned industries, such as energy infrastructure. This sort of decentralization can, paradoxically, lead to re-centralization of authority in private companies, undermining the potential for participation (Groves et al 2013).

At the core of this concern are questions of how - or whether - consent in such projects is achieved. In a Gramscian view, the dynamics of consent and coercion that form the basis of hegemony are never stable and are constantly being challenged by those who have been excluded (Ekers and Loftus 2013: 24). Recent geographic engagements with Gramsci (Ekers et al 2013) are particularly helpful for thinking about the formation of social movements that seek to unsettle de-politicized framings of participation and consent. As Featherstone (2013) observes, Gramsci was attuned to alliances that are forged across space and among disparate actors - e.g. between rural peasants and urban intellectuals - to unsettle hegemonic political projects. This line of thought is useful in framing my account of the movement forming to challenge small hydropower projects in Mexico, and how they seek to form connections across the heterogeneous socio-ecological space of a river basin.

As a question of regulation, environmental governance is an analytic that draws

attention to the shift in policies towards market-based schemes and privatization - that is, the neoliberalization of resource governance, understood as a highly variegated process (Tickell and Peck 1995; McCarthy and Prudham 2004). I am not concerned here with classifying environmental governance in Mexico according to a typology of neoliberalism(s), or asking whether there might be evidence of a 'post-neoliberal' turn (Yates and Bakker 2014). However, I do find the focus on regulation, and the way it frames the connections between institutional arrangements and regimes of capital accumulation, useful. Castree (2008) draws attention to the imbrication of 'de- and re-regulation' - that is, simultaneously 'rolling back' state functions (de-regulation), and deploying state power to facilitate privatization and marketization (re-regulation).

My understanding of regulation is informed by Bakker and Bridge's (2008) conceptualization which suggests that instead of focusing only on rules enforced by an administrative state, 'resource regulation' should be defined more broadly to encompass the negotiation of institutions at multiple sites and scales. Regulation, then, refers to "the processes by which resources are performed (against alternative claims) and through which the metabolism of dynamic resource landscapes (which can resist their enrolling as resources) is negotiated" (ibid: 220). This approach to environmental governance figures heavily in the history of hydroelectricity in Mexico that I re-construct in the following chapter, which follows the changing role of and relationships between different state agencies, private capital, technology and landscapes.

This notion of 'resource regulation' points towards an approach to environmental governance that considers resources as the central object - the things being governed. More than simply broadening the definition of environmental governance to include "all

*environmental resources*” (Paavola 2007: 94, emphasis in original), where these are seen as existing outside of their social construction, resources are more usefully thought of in relational terms. In Harvey’s (1996: 147) definition, ‘natural resource’ refers to the “cultural, technical and economic appraisal of elements and processes in nature that can be applied to fulfill social objectives and goals through specific material practices.” That is to say, what is defined as a resource and the ways in which they are used to fulfill objectives is constantly in flux and contested. Resources should be seen as simultaneously material and social, directing analysis towards “the complex arrangements of physical stuff, extractive infrastructures ...discourses...[and] everyday practices...that allow those substances to exist as resources” (Richardson and Weszklmyns 2014:7). Thus, re-centering resources in environmental governance means considering the implications of conflicting claims that value nature in particular ways.

By taking hydropower projects as the object of environmental governance I mean to place this technology within an assemblage of actors, laws, markets, resources, and landscapes. Beginning with this one object, my aim is to trace the associations that form this network (cf. Latour 2005) and to ask how governance of hydropower projects puts this broader set of relations in order. Taking a technological object as my starting point, approaches from Science and Technology Studies (STS) offer a useful set of conceptual tools for thinking about the relationship between technology, politics and landscape.

### The Politics of Technology

An ongoing debate in STS was sparked by Winner’s (1980) question, “do artifacts have politics?” Answering in the affirmative, Bijker (2007) argues that technologies of water management are ‘thick’ with politics, encoded with multiple meanings and values, both

reflecting and reproducing social relations. This assertion is echoed by Braun and Whatmore's (2010) call to see non-human things as constitutive of political life. Recently, however, Rowland and Passoth (2015) have challenged this, insisting that the ways in which technology internalizes politics must be demonstrated rather than assumed. While it may seem apparent that dams have politics, this is a welcome reminder to avoid a pre-formed narrative.

One way STS scholars have approached the politics of technology is through a social construction lens that considers the different meanings attached to artifacts (Bijker 2001). Broadly, this means tracing the contested process of technological development, attending to the ways that different groups and power relations influence this process (Pritchard 2011). Studies of the evolution of 'sociotechnical systems,' emphasize that infrastructure is highly path-dependent, as it must "wrestle with the inertia" of existing components - which includes both material constraints and the interests of different actors (Monstadt 2009: 1928). Infrastructure here is understood as an ensemble of technical artifacts, organizations, regulations, laws and other institutions (ibid; Star 1999; see Meehan 2013 on law as infrastructure).

Expanding this conceptual framework, Pritchard (2011) proposes the notion of 'envirotechnical systems' to approach the way that the relationship between nature and technology is represented by different actors. Her observation that a river may simultaneously embody multiple envirotechnical systems is acutely relevant here. In the following chapters, I trace the interaction of overlapping and conflicting envirotechnical landscapes of the Bobos-Nautla river basin as either a site of hydroelectric energy production or as an integral part of local livelihoods. Each of these efforts is underpinned by a distinct

infrastructure that shapes the way that technology and landscape become embedded in one another. These different visions of the river - as an engine of extractive development or one geared towards generating use values for communities - correspond with a distinction that Lefebvre (1991) makes between dominated and appropriated space. Envirotechnical visions aimed at dominating and appropriating the river have come into conflict at several moments in the river's history - often with surprising results, which I trace in chapter 5.

Since water and energy are 'stuck together' in hydropower (Bauer 2009), examining the politics of this technology requires an approach that attends to the material, socio-cultural and political-economic dimensions of these distinct resources. In order to develop what I call a 'political ecology of the water-energy nexus,' I bring together scholarship on the political ecology of water with geographic approaches to energy systems.

### Hydropower and the Hydrosocial Cycle

Analysis of the 'hydrosocial cycle' as a means to interrogate the relationship between water flows and power relations has recently gained currency among geographers. The premise of this analytic is that patterns of water circulation are simultaneously physical and social, creating 'hybridized socio-natural flows' (Swyngedouw 2009: 56). Although studies of the relationship between water, technology and power often bear the mark of Wittfogel's (1957) deterministic formulations (see Banister 2014), recent work in this vein has articulated a more nuanced approach. The strengths of the hydrosocial cycle are its simultaneous attention to the materiality of water, the meanings and values that inhere in it, and the discourses, ideologies and institutional arrangements that shape water flows (Linton and Budds 2014).

One focus of this work has been the transformation of water from a public good to a

commodity, suggesting that “water flows increasingly with the flows of capital” (ibid: 172). Recent attention to ‘water grabbing’ which frames the resurgence of hydropower as part of a trend of accumulation by dispossession, shifting water control from customary users to powerful private interests, is exemplary in this regard (Islar 2012; Mehta et al 2012; Franco et al 2013). However, as Karen Bakker’s (2003) work reminds us, water’s material properties make it difficult to “grab.” In her words, water is “uncooperative,” and resists efforts to treat it as a commodity.

Another important vein of hydrosocial research has focused on the politics of hydrologic science and the political work done by apparently neutral measurements and calculations (Budds 2009; Fernandez 2014; Bouleau 2014; Kakonen and Hirsch 2013). Whether constructed as relatively scarce or abundant, the production of these facts about water can have important political effects (Alatout 2009). As Jamie Linton argues in his work on the history of the hydrologic cycle and the construction of water as a modern abstraction, “the fact that a certain quantity of water is known to be present in a river...makes this water *available* to the agencies and the people who know water in this way. Making water available...is a political act, the first step of which is accomplished by merely knowing and representing water as a fact” (Linton 2010: 182). I pick up on this thread by looking at how knowledge and representation of water flows has been used to identify certain regions and river basins as sites of hydropower development, creating an air of inevitability that shapes the politics of these projects.

In addition to examining the production and use of scientific knowledge about water, scholars have considered the many meanings that are encoded in water by different social groups (Strang 2004). Thinking about the socially constructed meanings of water without

separating them from the technologies and institutions that materialize particular water flows, as Orlove and Caton (2010) suggest, leads to consideration of what Barnes and Alatout (2012) refer to as the ‘multiple ontologies of water.’ Water flowing in a river or held in place by a dam, water in a public drinking fountain or a private bottling plant - each of these waters is produced by a particular socio-technical assemblage and each internalizes a particular set of social relations (ibid; Linton and Budds 2014). Struggles over the meaning of water, its material control, and the social and political organization surrounding it, then, are intimately linked (Boelens 2014). This line of thought informs my narrative in chapter six that traces the connections between local knowledge of water flows, community water management institutions and the politics of hydropower in the Bobos-Nautla basin.

Construction of dams has been seen as an effort to ‘singularize’ the meaning of water as an input for production (Mollinga 2014), reframing what a river is and who it serves (Banister 2014). While much attention has been given to the way that dams enroll water in projects of modernity and nation-building (Kaika 2006), there are two ways that I want to redirect this narrative. First, the equation of dam-building with high modernism in which hydroelectric development is seen as a strategy to extend state control into rural areas (Bakker 1999) can lead to “all too sweeping analysis of the role of dams...in state and/or market led modernization” (Mollinga 2014: 193). The changing drivers and practices of hydropower development that I review in the following chapter suggest that these questions of the relationship between dams, nationalist discourses, and the role of the state should be held open. Second, while a hydrosocial perspective does much to expand the ways of thinking about connections between water, society and technology, the emphasis on *hydro* is insufficient for developing a political ecology of hydropower. That is, where this technology

is concerned, the material flows, political economy and meanings encoded in electricity become intertwined with those of water. A political ecology of the water-energy nexus should attend to the ways in which this occurs.

### Hydropower and Energy Geographies

Geographic engagements with energy have, until recently, tended towards technical and policy-oriented approaches (Jiusto 2009). However, as Calvert (2015:6) suggests, conceiving of energy as a social relation rather than an economic good or ecological phenomenon opens up numerous possibilities. This shift entails a recognition of the ways that “energy production, distribution and use underpin both material relations (i.e. landscape and livelihood arrangements) as well as immaterial relations (i.e. perception and representation).”

Importantly, the geography of electric energy has been shaped by its material properties. In particular, the difficulty of storing electricity - with the exception of storing water as ‘fuel’ in a reservoir (Bauer 2009) - meaning that generation and consumption must be matched at all times. Harrison’s (2013) history of electricity in the United States shows how this barrier shaped the strategies of electric utilities, which they overcame by creating new demand, manipulating regulations in ways that favored centralized, large-scale generation, and inventing financial instruments that would ensure continuous investment in expanding production. This history of the relationship between electricity, industrialization, and state regulation is helpful in framing the history of hydropower in Mexico that I reconstruct in chapter four.

The boom in small hydropower as renewable energy suggests that some form of ‘energy transition’ is at work here. While the definition of small hydro and its inclusion in

the category of renewable energy are controversial, this technology shares important characteristics with other renewables like solar and wind. Notably, these include a dependence on resource flows that are site-specific and the tendency to expand production into a greater number of sites to capture those flows (Calvert and Mabee, n.d.). What this means, following Bridge et al (2013) is that low-carbon energy transitions are often experienced as landscape transformations, as extractive and industrial activities expand into new spaces and communities. Rather than simply lauding the environmental benefits of a ‘sustainable transition,’ geographers have been raising questions about how renewable technologies become enrolled in circuits of capital accumulation and processes of uneven development (ibid). Whether an energy transition will lead to just or democratic outcomes is in no way inherent in these technologies as transitions are often driven by prevailing logics and power imbalances that determine ownership, access and the distribution of costs and benefits (Calvert 2015: 12).

One of the key concerns here is how and why particular sites are designated as acceptable (or not) for development of energy infrastructure. Andrews and McCarthy’s (2013) study of the way that configurations of law, property rights and relationships between different levels of government underpin the boom in extraction of shale gas is particularly instructive. My aim is to follow their call to examine the ways that claims to resources are articulated and contested in both legal and extra-legal contexts. As they point out, the former has often been overlooked in political ecology. In chapter five I trace the way that the Bobos-Nautla river basin has come to be defined as a site of hydropower development, and how this is contested in the arena of environmental law and policy. As I will argue, property arrangements around rivers - that have themselves been shaped by past hydropower

development - play a key role in defining the contours of contemporary legal conflicts. These arrangements are challenged by a social movement that agitates for local control of rivers through both legal and extralegal strategies.

## Chapter 3: Hydropower Development - From High-Modernism to Neoliberalism

Painted in broad strokes, the history of dams goes something like this: although various technologies to divert, store and generate power from rivers have been around for centuries, it was during the middle of the 20th century that dam construction accelerated at an unprecedented pace fueled by modernist utopian dreams of “subduing nature and marshaling water” (Molle 2006). By the end of the last century, resistance to the social and environmental consequences of large dams made this dream appear increasingly untenable. But after an apparent lull, dam construction is now re-intensifying, bolstered by policies that favor hydropower as a form of clean energy. Each ‘period’ of this history corresponds with different configurations of actors, institutions and discourses promoting and contesting dams. Here I trace these shifts, synthesizing from literature that approaches these issues in a variety of international contexts.

### Act 1: Rivers and Modernity

An oft-referenced - though nonetheless remarkable - figure that helps give an initial sense of the scope of river basin development in the 20th century is the increase from 5,000 large dams worldwide in 1950 to more than 45,000 in the year 2000 (Khagram 2004: 5). The construction of dams, and large-scale hydraulic infrastructure in general, became an emblem of progress and development during this era. Closely tied to this project of modernization qua river basin development was the emergence and consolidation of water as an object of scientific knowledge (Bakker 2012). In other words, the construction of water as a conceptual abstraction was linked to its technical control by cadres of experts (Linton 2010:

18). State-led efforts to achieve integrated river basin development through rational, efficient use of water corresponded closely with the emergence of hydrology as a scientific discipline, the principal aim of which was the quantification of flows. Water was constructed as a resource whose “stock” and relative scarcity could be known and calculated (ibid). Molle et al (2009: 332) encapsulate the ethos of this era under the term ‘hydraulic mission’: the idea that “not a single drop of water should reach the sea without being put to work for the benefit of Man.”

Conca (2006) identifies three key characteristics of this paradigm that held across multiple contexts. The first is that the state (whether in the U.S., the Soviet Union, post-colonial India or Egypt) acted to concentrate resources and configure property rights to facilitate these massive undertakings. Many of these efforts were financially underwritten by the World Bank and other multi-lateral and bi-lateral development organizations. Conca also points to the emergence of a transnational network of technocratic experts and an elite group of multinational corporations that dominated the dam-building industry as crucial to the spread of this model of development.

Although the network of experts promoting the hydraulic mission was undoubtedly trans-national, this characterization somewhat belies the central place within this network occupied by the U.S. Bureau of Reclamation which promoted river basin development programs - as well as American geopolitical interests - throughout Asia, Africa and Latin America (Sneddon 2012). A common touchstone for these projects was the Tennessee Valley Authority (TVA), which sought to integrate hydroelectric generation, irrigation, industrial development and flood control into a grand scheme of what James C. Scott (1998, 2006) refers to as “high modernist social engineering.”

While much has been written on the relationship between dams and modernity in the context of centralized resource management, little mention is made in these accounts of the regimes of water control that the state hydraulic mission superseded. In the Mexican case, early hydrodevelopment was carried out by a foreign investors with ties to national elites rather than as a state enterprise. This moment is one I will explore in depth in the following chapter as I sketch the intertwined histories of water and energy in Mexico.

### Act 2: Breakdown of the Hydraulic Mission?

Beginning in the 1980s, this modernist paradigm of river basin development began to come apart. Although political struggles aimed at detaining large dam projects were unfolding in numerous contexts, protests against the Sardar Sarovar project on India's Narmada River yielded a watershed moment that both reflected the changing politics of dam conflicts and dramatically influenced events that followed. In 1990, following more than a decade of opposition to the planned displacement of millions of people and thousands of hectares of forest (Khagram 2004), 5000 villagers set out on a march to protest construction of the dam which resulted in violent repression by police forces (Goldman 2001). The attention generated by this incident, and by the Save the Narmada Movement in general, through an increasingly globalized activist network, led the World Bank to conduct its first independent review of a dam project. Following this review the Bank was forced to withdraw its support. The sense of crisis that this generated within the Bank, known to many staffers as the 'Narmada effect' (Goldman 2001: 192), led to efforts to reform lending practices to address the grievances of social and environmental movements. This scenario points to two important shifts that were taking place at this moment. First, the emergence of transnational

advocacy networks that dramatically re-shaped the politics of dam construction. Second, the withdrawal of the World Bank from the Narmada projects hints at a changing political economy of the dam-building industry - and of hydropower in particular.

The global anti-dam movement, as Conca (2006: 175) notes, originated in conservationist efforts to preserve wilderness areas in the U.S., exemplified by David Brower and The Sierra Club's efforts to thwart the Bureau of Reclamation's plans to dam "unpeopled and unspoiled" areas of the Colorado River basin in the 1960s (Reisner 1986: 294).

Emerging out of this milieu, the International Rivers Network (IRN), formed in Berkeley, California in 1985 became a crucial node in this growing network. Over the course of the following decade, as the IRN engaged with numerous movements around the globe, their framing broadened from a largely environmentalist critique to a more comprehensive agenda that sought to draw connections between anti-dam struggles and a broader set of issues including indigenous people's rights, land reform, and concerns for social equity and control of resources (Conca 2006: 188). According to Khagram (2004), the claims made by these social movements and NGOs articulated with globally circulating norms concerning human rights, indigenous people and environmental sustainability, to fundamentally alter the political dynamics surrounding dam construction. By the late 1990s the World Bank dramatically reduced funding for dam projects - more on that later.

Largely as a result of this changing balance of power between civil society and the constellation of experts and professionals seeking to advance the hydraulic mission, the World Bank began a process of internal review in 1995 that eventually led to its participation in the World Commission on Dams (WCD) whose mandate was to "review the development effectiveness of large dams... [and to] formulate internationally accepted standards,

guidelines and criteria for decision-making...” (Quoted in Khagram 2004: 204).

The WCD spent two and a half years gathering information and compiling a series of recommendations that were released in their final report (WCD 2000). Although this process has been praised as “remarkably inclusive” and a “major achievement” (Baghel and Nusser 2010), it was not universally well received. In addition to drawing criticism from industry groups, the response from the World Bank was equivocal and exposed internal divisions within that organization (Conca 2006: 204). After initially indicating a willingness to at least consider the WCD’s recommendations - based on principles of equity, efficiency, participatory decision-making, sustainability and accountability - their Water Resources Sector Strategy released in 2001 pushed for investment in ‘high-risk, high-reward’ projects which effectively discounted the WCD guidelines (Baghel and Nusser 2010: 239). While the legacy of the WCD is still being debated (Moore et al 2010; Dubash 2010), its significance for Conca (2006: 201) hinges on whether its recommendations can become codified by particular nation states. However, shifts in the political economy of dam building towards privatization that were beginning to take shape in the 1990s, upon which I elaborate below, have re-worked the role of the state in ways that challenge this emphasis.

### **Dam Impacts as Matters of Concern**

The multiple and multi-scalar conflicts that emerged out of the rise of the anti-dam movement became “increasingly emotional, dogmatic, and confrontational” (Tortajada et al 2012). Disagreements center not only on normative claims about the social injustices/benefits attributed to dams, but on the facts of what the actual impacts of river basin development have been. One of the most striking figures reported by the WCD was their estimation that

large dams have been responsible for the displacement of 40 to 80 million people (WCD 2000). Without a doubt, this suggests that dams were implicated in sweeping social changes in the 20th century. But consider also that the margin of error in this figure is 100%! This speaks to the difficulty of establishing a stable knowledge base about dams, as nearly every fact is highly contested (Conca 2006).

In a recent volume on large dams, Tortajada et al (2012: 7) ask, "...why, in the twenty-first century, with major advances in science and technology, it has not been possible to answer the relatively simple question of the real costs and benefits of large dams, so that their net impacts and benefits can be determined authoritatively and comprehensively?"

If, however, we consider dam controversies not as "matters of fact," but as a "matter of concern" (Latour 2005) a different understanding emerges. This shift, as Latour explains it, is like "shifting your attention from the stage to the whole machinery of a theater" (Latour 2008: 39). Instead of matters of fact which are "indisputable, obstinate, simply there," matters of concern are "disputable...they overflow their boundaries, they include a complete new set of actors" (ibid). The question posed by Tortajada et al. is underpinned by an assumption that science will produce an "authoritative and comprehensive" truth that will collapse all political bickering into unanimous consent, suggesting that facts will "speak for themselves" (cf. ibid). But the impacts of dams have always behaved more like matters of concern.

One reason that the 'real costs and benefits' have proved so elusive to account for is that previously unrecognized problems have continually emerged as more dams have been built (Conca 2006: 170). Accumulation of sediment, for example, which can occur very quickly due to land use changes within a catchment – and which may be driven in part by

construction of a dam and expansion of irrigated agriculture - has often been overlooked by planners. In the case of the *Cerrón Grande* project in El Salvador, such unforeseen sedimentation led to a revision of the estimated useful life of the reservoir from 350 years to just 30 (Goodland 1997). It's not difficult to see how such an adjustment might affect the calculation of net impacts and benefits of a particular project.

While scientific knowledge is always contested, dam controversies provide a particularly rich arena for tracing such disputes. One reason for this is that production of scientific studies and assessments has frequently been integral to claims made both in support and in opposition to dam projects. McCormick (2007) examines knowledge exchange between social movements, researchers and policy-makers in Brazil, demonstrating the ways in which local knowledge has shaped research that challenged official calculations, in some cases affecting policy decisions.

Knowledge production practices of dam proponents have also been affected by the critiques leveled by social movements, as Michael Goldman's (2001) study of the World Bank shows. While acknowledging that their assessment process did become more open and transparent in some ways, he argues that the "green" knowledge produced by teams of consultants about the impacts of the Nam Theun 2 project in the Mekong basin had the effect of legitimizing large-scale capital investments in the region. That is to say, rather than a lack of "authoritative and comprehensive" knowledge about dam impacts, there has been a tremendous effort to produce such information. This encompasses both efforts to silence criticism by conducting more comprehensive studies of impacts - thereby making this knowledge more authoritative, in the sense of commanding authority (Goldman 2001) - and efforts by social movements to challenge this authority by producing an alternative set of

facts within the same idiom.

### Act 3: Resurgent Hydropower

Thus far, I have been somewhat loose in referring to dams and hydropower interchangeably. In this section, I want to shift the focus squarely onto the political economy of hydropower, which is key to understanding the present moment. Amid the political volatility surrounding big dams in the 1990s, the World Bank cut expenditures on hydropower by 25% as a portion of its total lending (Briscoe 1999). While this might have appeared to some as a reflection of the inevitable failure of the hydraulic mission and an indication of the growing influence of transnational social movements, the forceful resurgence of hydropower development over the past decade and a half suggests otherwise. What changes in the Bank's investment portfolio do shed light on is a changing configuration of actors promoting these projects, and changes in the financial structure and governance of the industry. Important trends include changing financial practices, and re-framing of hydropower as part of a low-carbon energy future.

Even amid the apparent crisis of the state hydraulic mission in the 1990s, changes in the structure of the hydropower industry were already creating the conditions for its resurgence. Indeed, even at the height of these conflicts the World Energy Council predicted that global hydropower generating capacity would more than double by 2020 (Churchill 1997a), suggesting no lack of confidence on the part of industry insiders and planners. In a study of the changing political economy of water infrastructure projects during this era, Briscoe (1999) suggests that the drop in World Bank spending on hydropower was being offset by the use of public funds in developing countries, allowing the Bank to duck criticism by shifting investments to less contentious projects. This suggests that the dramatic downturn

in large dam construction heralded by Khagram (2004), may actually have been a reflection of the difficulty of tracking and compiling global data as funding shifted away from the IFIs.

At the same time that Briscoe (1999) noted the apparent move by states to fund hydropower directly - an observation which has proved to be shrewd, particularly as China has become a major investor in projects throughout Asia and Africa (Moore et al 2010) - energy sectors in many countries were in the throes of de-regulation and privatization. This meant increasing participation by the private sector in hydropower and new models of public-private partnership (Churchill 1997a). The electric power industry was becoming increasingly “business-like” at the turn of the millennium, meaning that hydropower investments were ever more embedded in a context of “rapid technological change, complex financial engineering, and a lot of financial information” (Briscoe 1999: 461).

These changes have important implications for the allocation of risk between and among public and private actors involved in projects. Deregulation and privatization mean that risks that were once assumed entirely by governments are shifted to private developers and their would-be financiers who are not always eager to assume this burden in an industry where projects frequently exceed projected costs by staggering amounts due to unforeseen surprises, such as geologic failures (Churchill 1997b). Where once governments set energy prices, in a context of deregulated energy markets, hydropower is increasingly exposed to volatility that makes the long-term profitability of a project difficult to predict. Considering the state of the hydropower industry in the 1990s, Churchill (1997b: 116) laments the lack of firms capable of assuming the risks necessary to develop projects, asking “where is the Enron of the hydro business?” To resolve this dilemma, he calls for strategies to share risk between governments and private developers.

The specific arrangements that have been made to this end are exceedingly complex and often out of the public view, but Merme et al.'s (2014) study of hydropower finance in the Mekong points to the increasing prevalence of private capital, with IFIs taking on the role of providing financial guarantees such as "Political Risk Insurance." This increasing financialization of hydropower means that profits can potentially be derived from speculation alone, without the need for projects to actually generate electricity (Ahlers et al 2015).<sup>3</sup>

Even as the relationship between the old and new guard of hydro financiers evolves, the World Bank has renewed its interest in the sector. Their investments in hydropower have steadily increased after reaching a nadir in 2001, and now exceed the levels of spending seen in the 1990s (Rex et al 2014). In this recent report (ibid), they stress that of the projects that have received the nearly nine billion dollars the Bank has invested in this period, more than half are considered small (under 30MW).

Alongside changing patterns of investment and financial practices, new booms in hydropower are being fueled by marketing carbon-offset credits for dam projects (Moore et al 2010). Within the market established under the Clean Development Mechanism (CDM), hydropower outnumbers all other project types with more than 1400 currently approved (mostly in Asia) and hundreds more in the pipeline (Erlewein 2014). In addition to the questions about the actual carbon emissions from reservoirs - Philip Fearnside has called carbon credits for hydropower a "major source of 'hot air'" (Fearnside 2013) - several scholars have also called into question the criteria of "sustainable development" for CDM hydro projects by looking at their negative environmental and social outcomes (Erlewein and

---

<sup>3</sup> As I discuss in the concluding chapter, it's not entirely clear how widespread this is, nor exactly how it might work. The explanation offered by Ahlers et al (2015) is that risks associated with hydropower (e.g. changing energy prices) can be commodified through various hedging mechanisms which can become a source of profit in and of themselves. Sanda et al (2013) find that Norwegian hydro firms derive significant profits in this way.

Nusser 2011; Finley-Brook and Thomas 2011). Alongside the CDM, many countries include expansion of hydropower as part of national strategies for reducing emissions and achieving “low carbon development” (Escobar and Clark 2011).

Given the well-known impacts of dams - slippery matters of concern though they may be - it should perhaps come as no surprise that opening up new avenues of funding has not been sufficient to change this pattern. However, while the framing of hydropower as low-carbon development may be seen by some as facilitating the continuation a deeply rooted pattern of “hydrologic colonialism” associated with dams (Elrewein 2014), this discursive shift has important implications. Where anti-dam activists once claimed environmental concerns as their exclusive territory, the notion that hydropower development is a viable strategy for climate change mitigation has allowed proponents to position themselves as the “real” environmentalists (Moore et al 2010). For Fletcher (2010), the terms of debate have been fundamentally altered by this re-framing which undermines the moral claims that had previously been used to great effect by anti-dam activists.

### The Rise of Small Hydro

Increased interest in tapping the potential of small hydropower fits squarely within these trends. If hydropower has generally been re-framed as a low-carbon energy solution, the “greening” of hydroelectricity has been particularly pronounced with small projects (Abassi and Abassi 2011). Small hydro is also particularly suitable for private investment given the relatively low fixed costs compared to large dams. However, as Paish (2002) notes, environmental incentives are necessary to make investment in small hydropower competitive with non-renewable energy sources. In every country where small hydro has taken off, some

form of government intervention in setting tariffs and market conditions to favor this technology have been necessary (Meier et al 2011). So with this technology we see the convergence of several trends - privatization, environmental discourse promoting projects, and the emergence of regulatory/financial tools to realize the potential of this “clean energy.”

What is meant by “small” hydropower? There is no universal definition, and upper limits vary widely by country. In all cases, though, the size of a project is measured in terms of generating capacity. Paish (2002) and Abassi and Abassi (2011) point to a generally accepted upper value of 10MW (megawatts), with 25MW as a high value in some cases (e.g. India and China). However, in at least one case (Turkey), up to 50MW is considered small (Islar 2012), and in Mexico the ostensible upper limit is 30MW. The International Commission on Large Dams (ICOLD), however, defines “large” as 15m or higher, so it is entirely possible for a small hydropower project to be, at the same time, a large dam. Although this is possible - and indeed one of the proposed projects that I discuss in the later chapters fits this description - such projects are likely to be a minority, as most small hydro doesn’t use an impoundment design. While some have claimed that most small hydro is “run-of-river” (Bakis 2007), this term is also used loosely. In the classification proposed by Egge and Milewski (2002), the most common design for small hydro is the diversion type. This is a significant difference - a run-of-river plant neither diverts a river’s flow nor impounds it in a reservoir, while a diversion scheme involves blasting tunnels through a mountainside, substantially altering landscapes and ecosystems.

An important point here is that whether a particular project has minimal or significant environmental effects is not simply a function of size (ibid; Abassi and Abassi 2011; Kumar et al 2011). The addition of the “small” label is frequently accompanied by an assumption (or

claim) that a project will have little or no negative impact, often with no further evidence (Abassi and Abassi 2011). In fact, small diversion-type hydropower has one particularly salient environmental impact - the effect on flow regimes between the intake and outflow points. Reduced flow below the diversion can be linked to erosion, changes in water quality, and can negatively impact aquatic ecosystems (Egre and Milewski 2002). While rules may be in place to ensure that a minimum flow is maintained, maximizing economic output of a plant and maintaining ecosystem quality are often at odds with this type of project (Lazzaro et al 2013), and such rules are sometimes ignored or unenforced (Islar 2012).

While there has been a recent renewal of attention to the need to establish ‘environmental and social safeguards’ for hydropower (Skinner and Haas 2015), these calls generally focus on large dams, overlooking small hydro entirely. One of the key questions surrounding this technology concerns the cumulative effects of developing multiple projects in one river basin, and whether these impacts are evaluated at the level of individual projects or strategically at a broader scale. As I will argue, in Mexico the initial rush to develop small hydropower has been characterized by a lack of oversight which is actively being challenged by groups pushing for an institutional framework that acknowledges these impacts. That favoring economic gain of private capital over careful planning and democratic decision-making is not the exception is demonstrated by Shaw’s (2011) work on small hydro in British Columbia. In that case, environmentalists supported a policy that opened up small hydro development, which turned into a rush to enclose the province’s rivers in a process of “willy-nilly industrialization of the landscape” (Shaw 2011: 753). There have been few other case studies of the politics of small hydro, but I suspect that a similar scenario is currently playing out in many different contexts.

While a comprehensive account of the current scale of small hydro development across the globe is beyond my scope here (though see Abassi and Abassi 2011 for an attempt at this), I want to point out that the technological specifications of this technology implicate a particular landscape - simply put: steep, wet, mountainous regions.<sup>4</sup> This means that small hydro is being planned in remote rural areas, which - at the risk of making a sweeping generalization - are often occupied by marginalized, impoverished groups, and are at the same time sites of tremendous cultural and biological diversity. Along with the claim that small hydro has little or no environmental impact, an assumption is built into literature on the future of this technology that it will be for rural electrification in underdeveloped regions (Paish 2002). This claim has also been made in Mexico (see chapter 4), though I see no evidence to support it. The question that should be asked, then, is: who does benefit from the energy generated in these remote regions and how is this shaped by institutional and infrastructural configurations?

---

<sup>4</sup> The two main technical considerations for small hydro are the head (velocity) and volume of water. An installation can be either high head (i.e. steep topography with a relatively low volume of water) or low head (greater volume of water with less elevation differential). As Paish (2002) points out, high head systems are more cost effective, and therefore a more attractive investment. He goes on to state that few undeveloped high head sites remain in “developed regions” and as such the greatest growth might be expected in low head sites. However, recent efforts to expand small hydro into previously undeveloped regions – catalogued extensively by the UN-Backed Small Hydro World (Liu et al 2013) – suggest that previously overlooked high head sites are increasingly the center of focus, although there is no disaggregation in this report along those lines. The growing case literature on small hydro, such as Shaw (2011) and Islar (2012) seems to confirm that areas of rapid growth of small hydro have been in remote, mountainous regions.

## Chapter 4 – Hydro-History in Mexico: Capital, Hydrocracy and ‘Public Utility’

In this section, I reconstruct the history of hydropower in Mexico in order to contextualize the conflicts that I describe in the following chapters. Spanning more than a century, this history chronicles a shift from largely unregulated private development, to the rise of a centralized state apparatus that oversaw the construction of massive hydraulic infrastructure, and finally to a re-opening of the sector to private development.

In tracing the shifting relationships between public and private actors, my aim is not to reify the boundary between the two but to bring attention to “the ways in which the state and private actors strategically re-position their allegiances and commitments” (Bakker and Bridge 2008: 229) in this shifting landscape. As I discussed in the previous section, most dam histories begin with the era of high-modernism, often overlooking the fact that these new regimes of river basin development articulated not only with “pre-modern” uses of water, but also previous iterations of the “hydraulic mission.” In the Mexican context, power struggles between private capital, the hydraulic bureaucracy, and users of rivers in the early decades of the twentieth century shaped the trajectory of hydropower development in important ways. Because the scale of technology and the relationship between state and private actors in the earlier era and the current moment contain important parallels, the former deserves some extended consideration.

The origins of the electric industry in Mexico are closely tied to the emergence of hydroelectric plants that were built to power mining operations and textile factories in the late 19th century (Ramos-Gutierrez and Montenegro-Fragoso 2012), transforming landscapes that had once been seen as “inconvenient” - mountainous terrain incised by rushing rivers - into a boon for industry (Gonzalez 2005:125). While water-powered mills had been used for

centuries, the introduction of the electric turbine made these more torrential streams suddenly attractive to investors. The excess energy produced was sold - often at exorbitant prices - to municipalities which used it to illuminate public spaces, power streetcar networks and pump water through a growing urban distribution network (Parra 1988). The economic changes brought about by these new uses of water in large-scale industrial and infrastructure projects were coupled with a process of centralization of authority over water in the federal government that transcended major political upheaval in Mexico and continued well into the 20th century (Aboites 1998).

The growth and expansion of hydroelectricity was driven by investment of foreign capital, mostly by British and later American and Canadian industrialists who established close ties with the regime of Porfirio Díaz (ibid). During the era of Díaz' rule, known as the *Porfiriato* (roughly 1877-1910), the president and a group of advisers called 'the scientists' designed ways to stimulate foreign investment while further concentrating wealth in the hands of an aristocratic elite, including through administration of 'concessions' for water use. Regulation of these concessions was critical to the early development of the electric power industry (Parra 1988).

The sites that attracted investors were typically rural, agrarian areas where users traced their water rights to colonial decrees from the 16th century (Castañeda Gonzalez 2005). While in no way idyllic, as water was mostly controlled by hacienda owners and conflict between them was frequent, industrialization and hydropower pushed this dynamic into a crisis that led to the first of many efforts by the federal government to centralize control over water and overturn this local autonomy.

To back up a bit, under Spanish colonial law, water was treated as property of the

Crown, which could transfer use rights<sup>5</sup> - but not ownership - to individuals or communities (Gillilan and Brown 1997). Despite the ostensible centralization of authority embedded in this framework, administration of water rights in the colonial period became increasingly decentralized to local organizations which established their own administrative systems - a trend that became even more pronounced following independence (Gonzalez 2005).

However, as water use intensified in the 1880s, the federal government sought to re-establish the principle of *dominio eminente* that underpinned Spanish water law, vesting the right of “absolute property” in “the nation” in place of the king (ibid: 128). This speaks to a paradox of water governance in Mexico during the Porfiriato. On the one hand, the federal government’s efforts to centralize authority were couched in legal concepts that referred to water as a public good, countering a trend towards treating it as private property. However, the impetus for this was the notion that exercising federal control over water would attract foreign investment, and it was these private interests that the new laws favored (Aboites 1998).

The first effort in this direction, in 1888, exposed how weak federal authority over water resources was at that point. Since there was no precedent for federal intervention in administration of water rights, the Díaz regime used an obscure constitutional principle that established federal control over “routes of communication” - including navigable rivers - to intervene. The powers this conferred to the central government were limited, however, and pre-existing rights were generally respected (Gonzalez 2005). A 1902 law introduced the concept of “public domain” and the “inalienable and imprescriptible property of the nation over water.” These concepts were reinforced with laws and reforms in 1908 and 1910 - on

---

<sup>5</sup> Known as *mercedes* or *repartimientos*

the verge of revolution - which gave the federal government the power to regulate water use and modify existing rights, as well as defining which waters were to be considered federal property (ibid). Although based on principles recovered from Spanish water law that prioritized use of water by communities over individuals, the framework that emerged from these reforms emphasized the rights of individuals and businesses, paradoxically treating water as private property while emphasizing its public and common character. According to Aboites (1998), these early efforts to centralize control over water were marked by confusing and inconsistent bureaucratic practices, but nonetheless were effective in facilitating large scale hydropower and irrigation projects.

While the administration of water concessions during this period is generally seen as a strategy to dispossess rural water users in the interest of a powerful elite (Parra 1988; Aboites 1998), a more detailed examination of this dynamic complicates the picture somewhat. One of the few historical studies of conflicts over water in this context, Castaneda Gonzalez' (2005) *Las Aguas de Atlixco*, provides such an empirically rich account that it is worth looking closely at some of her findings. Her study looks at the boom in hydropower and textile factories in the Nexapa and Cantarranas river basins in Puebla that began in the 1880s, the conflicts this provoked and the changing role of the state in this scenario.

While acknowledging the novelty of federal control of water rights, Gonzalez argues that in practice these new legal instruments and pressures on water use did not completely displace local conflict resolution mechanisms and water rights inherited from the colonial era. One dispute is particularly illustrative of this point - a complicated scheme conceived by Sebastián B. de Meier, an investor with close ties to the Porfirian government, involving an inter-basin water transfer for both hydropower and irrigation that generated heated conflict.

Briefly, de Meier had planned to sell the transferred water to the haciendas located along the Nexapa River, but when the project was completed they refused to purchase it but continued to divert water from the river whose flow was now nearly doubled. This led de Meier to request intervention from the federal government to limit the hacienda's water use. At the root of this conflict was the question of whether the colonial water rights of the haciendas, which allocated a certain number of "*surcos*" to each user, ought to be fixed to a specific volume or a proportion of the river's flow. The concession granted by the federal government to de Meier for his project fixed the volume of a *surco* at 6.5 liters, a measurement which he argued should apply to all other users. However, the distribution of water in the Nexapa since the colonial *repartimientos* had effectively treated the *surco* as a proportional distribution rather than a strict volume. Because this distribution had been used to determine the design of each user's water intake structure and these had remained unaltered, the federal government ultimately concluded in favor of the hacienda owners (Gonzalez 2005: 133-154).

This instance speaks to a couple of important points about the implications of this transformational period. Apparent here is the connection between efforts to make rivers into a driver of industrial development and a shift in how water is known that emphasizes quantification of flows for this purpose (cf. Linton 2010). But equally apparent is that this shift was messy and contested. Even under a regime that by all accounts sought to reconfigure property rights to favor the interests of industrial capitalists, instituting a new regime of water control met with multiple forms of resistance – from the vested interests of hacienda owners, from disaffected peasants, and from rivers whose flows proved difficult to measure and predict.

The scenario captured by Gonzalez' study in which many companies competed for control of rivers quickly dissolved as a few major players established regional monopolies on electric generation by building larger projects and transmission networks that connected them to distant cities and mining districts (Parra 1998). Exemplary in this regard is the Mexican Light and Power Company, a Canadian-backed company which built what was then the largest hydroelectric plant in Latin America at Necaxa, Puebla (completed in 1910).

In sum, rapid scaling up of hydraulic infrastructure projects in this period fueled by technological advances, mobilization of large sums of capital and centralization of authority in the federal government also led to a re-scaling of water conflicts. These projects engendered conflicts that were no longer merely “local,” but implicated multiple constituencies at a wider scale. According to Aboites (1998), these technological changes and the conflicts they provoked helped *produce* the river basin as a way of understanding water resources in Mexico. This new vision was “sustained by concrete business practices...[of] businessmen who seemed to think they were the owners of the water and land” (Aboites 1998: 73), practices which sparked conflicts that ensnared groups along the length of a rivers' flow as never before.<sup>6</sup>

### From Revolution to Nationalization

As a number of scholars have noted, rather than breaking with the trend towards centralization of water management initiated during the Porfiriato, the post-revolutionary state moved further in this direction (Aboites 1998; Banister 2014; Meehan 2013).

---

<sup>6</sup> Aboites points to four cases that best encapsulate this shift – the expansion of irrigated agriculture in Comarca Lagunera and the Yaqui River basin (both in the north), and plans to reclaim land by draining large lakes in the center of the country (Chalca and Chapala).

Specifically, article 27 of the 1917 constitution established land and water as property of the nation and enshrined the “inalienable and imprescriptible” concept introduced in the 1910 water law. At the same time, water and electricity were divided into separate bureaucratic structures for the first time, with water falling under the jurisdiction of agriculture (the *Secretaria de Agricultura y Fomento* or SAF) and electricity under the secretary of industry and commerce.

Although this speaks to the continuities that span the pre- and post- revolutionary periods, it is also important to note that the emphasis on the rights of individuals and businesses that had predominated in the earlier era were replaced with a system that recognized the rights of collective social organizations to access land and water (Aboites 1998). However, efforts to limit the influence of private companies and foreign capital were particularly tricky when it came to the burgeoning (hydro)-electricity industry. Although this industry was concentrated in the hands of a few foreign-owned companies, urban life had increasingly come to depend on a steady supply of electric power. Thus, throughout the 1920s the government displayed a “two-faced” tendency - both protecting these companies by repressing labor movements as well as attempting for the first time to regulate their behavior (ibid: 101).

As private electric generation continued to expand during this period, a group of engineers in important bureaucratic posts, led by one José Herrera y Lasso, began to push for state intervention and regulation (Díaz Molina and Saldana 2013). This led to the formation of the *Comisión Nacional de Fuerza Motriz* (CNFM) in 1923, which established regulations for installation of electric infrastructure and made recommendations about water concessions for hydropower - including shortening the duration of those that had been granted during the

Porfiriato (ibid). One of the CNFM's foundational principles was "that it is a primary duty of the state to care for the conservation of hydraulic resources." It is notable here that this first attempt to regulate electricity directly and very prominently addresses its implications for water management.

Perhaps unsurprisingly, this effort was resisted by companies that invoked the "rights of private property" and "industrial freedom" in refusing to comply with the CNFM (ibid). Despite these difficulties, the CNFM laid the groundwork for the National Electric Code in 1926, the first attempt to enshrine regulation of this industry in law. This law established the "*utilidad pública*" or public interest of development of the electricity sector (Parra 1988), a concept that would be widely used in subsequent decades to justify expropriation of private and communal land for hydropower development (Robinson 2000).

Entering the 1930s, the state took a more overtly interventionist stance towards the hydroelectric monopolies. The first *Plan Sexenal* issued in 1933 - a document outlining the philosophy and plans of the government during the following six-year presidential term (*sexenio*) - addressed this issue at length. The overarching goal of this plan was to "organize our life as a nation, according to a principle of distributive justice and integration of the collective effort..." (Quoted in Díaz Molina and Saldana 2013: 165). As with the CNFM, in this document discussion of electricity turns immediately to the "situation of hydraulic resources," identifying a number of problems: a lack of rational policy for water use, lack of scientific and technical data, little knowledge of current use of water and a "defective" system of organizing water users. As a remedy to this situation the *plan sexenal* suggests formulating a "precise national policy for use and administration of hydraulic potential," including state intervention in hydropower companies and studying the possibilities of future

hydroelectric development by the state.

This plan led to the formation of the short-lived *Departamento de Potencialidad Hidráulica* (1934-1937), which counted among its goals “to study and execute...all projects which tend to convert the use of waters for generation of power into a social function of the State, rather than one of speculative companies” (quoted in Díaz Molina and Saldana 2013: 171). This plan also paved the way for the creation of the *Comisión Federal de Electricidad* (CFE) in 1937, with the goal of establishing a national system of generation, transmission and distribution of electricity. Beginning with just 15 employees and a minimal budget (ibid), the CFE would soon initiate an era of state-led development of enormous hydraulic infrastructure.

While the formation of the CFE and its intentions to displace the private hydropower monopolies would appear to signal the further consolidation of federal control over water, it also speaks to the deepening bureaucratic fragmentation within the federal government. Alongside the CFE, a federal bureaucracy concerned largely with expanding irrigation - first as the *Comision Nacional de Irrigacion* (CNI) and later as the *Secretaria de Recursos Hidraulicos* (SRH) - was also gaining strength. For the technocrats and engineers of the latter, dividing control over federal waters by allowing the CFE to develop hydropower was long resented (Aboites 2009: 78). Although the first major CFE project was just west of Mexico City,<sup>7</sup> the rivalry between these two heads of the “hydraulic leviathan” (Musetta 2009) soon expressed itself in their divergent regional interests. Though not without exception, the SRH was concerned with expanding water storage and distribution for irrigated agriculture in the arid northwest (e.g. the Yaqui and Mayo valleys in Sonora), while

---

<sup>7</sup> Originally built as a hydropower project, in the 1970s these reservoirs were tapped to supply water to Mexico City.

the CFE turned its attention to the powerful rivers of the sub-tropical southeast (ibid; S. Robinson 2000).<sup>8</sup>

In the 1940s, president Miguel Alemán launched a series of river basin commissions modeled on the Tennessee Valley Authority (TVA) which aimed to mobilize water as an engine of development in the “backward” tropical regions of the country (Tortajada and Contreras-Moreno 2007:91). Even though hydropower and irrigation were both part of these plans, they continued to function as separate projects as Barkin and King (1970) note in their detailed economic analysis of the Tepalcatepec and Papaloapan River Basin Commissions. Although the Papaloapan Commission was a catastrophic failure in many respects (Tortajada and Contreras-Moreno 2007; Barkin and King 1970) and many of its planned dams were never completed, one of the “successful” projects in that basin displaced an estimated 25,000 people from indigenous Mazatec communities (S. Robinson 2000). In a horrendous episode, the army was employed to remove those who resisted, and the reservoir even began to fill before evacuation of the area was complete (Velazquez Garcia 2010). This case is exemplary of the politics surrounding hydraulic infrastructure in Mexico in the mid-20th century, a “scenario wherein political and police power [were] used to endorse, negotiate and coerce compliance on the part of reluctant citizens forced to leave their homes and abandon their productive assets for the public interest” (ibid: 5).

Nationalization of the electric industry in 1960 under president Adolfo Lopez Mateos, along with plans to double generation capacity, further strengthened the role of the CFE. Although Lopez Mateos continued to promote the plans of the Basin Commissions - even announcing the creation of a new one for the Balsas River alongside the announcement of

---

<sup>8</sup> All the same, many dams in the North that were originally built for irrigation are also managed by the CFE as hydroelectric facilities.

nationalization (Lopez Mateos 1960) - this model would soon be defunct. Instead, under President Díaz Ordaz the federal government would undertake “a radical program of energy exploitation with the CFE in the vanguard” (N. Robinson 2009). While one aspect of this program was a shift away from dependence on hydropower, which was surpassed by thermal generation as the leading source of electricity in the 1970s, it also entailed construction of massive hydroelectric dams on the Grijalva River in Chiapas which would be linked to a new national electric grid (ibid). As Niklas Robinson’s (2009) history of the “Decade of the Grijalva” (beginning in 1968) shows, construction of La Angostura dam - financed with hundreds of millions of dollars in loans from the World Bank and IADB - transformed the landscape of this region, but not without meeting resistance from displaced people and an unpredictable environment.

The move to establish a national electric grid signals another important shift in the political economy of hydropower. While earlier projects like Necaxa had revolutionized distribution by transmitting electricity over several hundred kilometers, this spatial decoupling of generation and consumption was now taking place at a much broader scale. Thus, as Barkin and King (1970: 225) observed in the Tepalcatepec, expansion of hydroelectric capacity fueled industrial and urban development around the capital rather than in the surrounding region - this despite the political rhetoric justifying projects as drivers of *regional* economic growth and industrialization (cf. N. Robinson 2009: 14).

### Neoliberal Reforms

The technological optimism of the big dam era suffered a major blow with the onset of Mexico’s debt crisis in 1982, which drastically reduced spending on infrastructure projects

(S. Robinson 2000). Around this time, opposition to the authoritarian ruling PRI party also began to mount and social movements against dams began to mobilize with some success, including cancellation of several projects and victory in a lawsuit against the CFE by displaced communities (ibid). Pressure on the CFE also came from the World Bank, which pushed for “participatory resettlement” and from the National Indigenous Institute (INI, later changed to National Commission for the Development of Indigenous Peoples).

Neoliberal reforms implemented in the 1990s have broad ramifications for hydropower development. A 1992 reform to the *Ley de Servicios Publicos de Energia Electrica* (LSPEE) ended the CFE’s monopoly on generation that had been in place since nationalization in 1960, carving out certain exceptions under which private companies could enter the playing field. Cuts in public spending led the CFE to turn to new models of public-private partnership to finance large hydropower projects. The accounting practice known as ‘Pidiregas<sup>9</sup>,’ which allows for sub-contracting projects to the private sector and deferring their registration in the budget until completion, has been used to build at least one mega-dam (750MW La Yesca in Jalisco, completed in 2011). This shift, according to Olvera Molina (2011: 262) signals a re-structuring of the CFE that “transforms it from a producer of energy...to a manager of contracts.” Stated otherwise, this is a shift from a Fordist to Post-Fordist mode of production characterized by massive cuts in public spending and a rise in public-private partnerships. The need to attract new investment, Olvera Molina argues, has led the CFE to reinstate projects that were previously considered too risky, costly or conflictive – and their list of potential projects currently stands at more than 500 (ibid). While the CFE continues to push development of several mega-dams - with a regional focus

---

<sup>9</sup> Long Term Productive Infrastructure Projects with Deferred Spending Impacts

shifting to the west (i.e. around Guadalajara and Acapulco) after decades of conflict in the south (ibid) - the partial privatization of electric generation has also helped generate a boom in “small” hydro.

In addition to changes in the political economy of electricity, the 1990s also saw significant changes in water and environmental law. A new *Ley de Aguas Nacionales* passed in 1992 re-organized the hydraulic bureaucracy, or ‘hydrocracy,’ in Wester et al’s (2009) terminology, under the *Comision Nacional del Agua* (Conagua). This law, among other things, established a national registry of water rights, created a market for them, and devolved authority over irrigation districts to user groups (Wilder and Romero Lankao 2006). Intriguingly, exchange of water rights for hydropower between private companies now accounts for the greatest volume in this market (Aguilar 2013).<sup>10</sup>

Aboites (2009) sees this as a paradigm shift from the ‘waters of the nation’ model to one of ‘environmental-mercantile water.’ More than the 1992 law, he argues, this shift lies in a decision made in 1985 to charge for the use of water for the first time since the 1920s. Facing budget cuts, the hydrocracy no longer measured its worth in the expansion of irrigated agriculture but in the collection of fees (ibid: 90). This new discourse of water governance incorporates concerns for the environment and public participation, which parallel 1996 reforms to environmental law. Drawing explicitly on the 1992 Rio Convention, these reforms aimed to strengthen the Environmental Impact Assessment process and a land use zoning practice known as *Ordenamiento Ecologico del Territorio* (Ecological Ordering of Territory) by incorporating “mechanisms of social participation” (Azuela et al 2009: 6). Precisely what

---

<sup>10</sup> This is due to water concessions for a few large dams changing hands between private companies beginning in 2008. Through INFOMEX I obtained a list of the water concessions that account for this trading, but none of those on the list are currently listed in the public registry of water rights.

these changes mean for governance of hydropower development is a topic I will discuss in the following chapter.

The increasing prevalence of private companies in hydropower development in Mexico raises a number of questions about equity and justice in the decision-making process. Scott Robinson's (2000) report to the WCD encapsulates the issue well, suggesting that while this new model likely reflects "a legacy of State impunity converging with a rampant privatization process ignoring the rights, human and environmental, of those impacted by energy infrastructure projects," it may yet be more feasible to develop a set of norms to regulate privately funded projects than for ones promoted by State actors alone. These questions are increasingly salient following the energy reforms of 2013/14 which further open electric generation to private participation and effectively expands the definition of "public utility" to allow the government to expropriate land for private infrastructure projects (Parker et al 2014). These reforms also create a market for clean energy certificates intended to incentivize increased generation from renewable technologies.

During this era of neo-liberal reforms, environmental and anti-dam movements also began to coalesce. The history of political mobilization around environmental issues in Mexico has been marked by a tension between "conservationist" and "social-ecological" approaches (Madrigal González 2010). The former can be traced to the influence of, among others, Miguel Angel de Quevedo, an engineer who dedicated his career to protecting the nation's forests in the early decades of the 20th century. Along with establishing a forestry school and promoting numerous conservationist policies, Quevedo also played an important role in the early formation of the electric industry where, interestingly, he was a major

advocate for a transition to the “white coal” of hydropower as a substitute for the widespread use of wood fuel (Casals 2013).

The latter strain of environmentalism, Madrigal González (2010) traces to conflicts that emerged in the late 1960s and early 1970s over community control of forests, practices of mining companies and the dams built in the Papaloapan basin. In these instances, environmental concerns were linked with ongoing labor and land struggles. Through the 1970s, even as the effects of environmental degradation became increasingly evident, a sustained national movement was yet to emerge (ibid). These localized protests prompted efforts on the part of the federal government that can be seen as an attempt to co-opt them “without affecting the modernizing project of the country” (Madrigal González 2010: 407). In the 1980s, as the number of environmental groups quickly multiplied, so too did the bureaucratic apparatus charged with overseeing environmental issues. Although this decade saw some progressive changes in policy, the professionalization of the environmental bureaucracy under the new Secretariat of Environment, Natural Resources and Fisheries (Semarnap, later Semarnat) allowed president Carlos Salinas de Gortari to channel support to groups he saw as political allies while using endless legal proceedings and the withholding of funds to stymie his critics (Velazquez Garcia 2010).

The election of Vicente Fox in 2000, the first president from outside the political machine of the PRI in more than 70 years, led to an expectation of greater opening of political participation for civil society and social movements (Madrigal Gonzalez 2010). At the same time, Fox did not maintain the clientelistic relationships with labor organizations that had developed under the PRI. Along with headline-grabbing conflicts over infrastructure projects, these factors combined to generate a new wave of social-environmental protest. One

of the conflicts that sparked these new movements concerned a large dam planned by the CFE near the city of Acapulco called La Parota. In 2004, a group of activists from more than 60 organizations gathered at a meeting near the proposed site of the dam to declare the formation of a national anti-dam movement, MAPDER (*El Movimiento Mexicano de Afectados por las Presas y en Defensa de los Rios*) (Gomez Fuentes 2015).

The relationship between this particular dam conflict and the emerging national movement evinces several important themes of the shifting political landscape. One of MAPDER's core strategies is that it functions as a network, with each particular case being led by a local group that coordinates with the broader group of activists and organizations that undertakes media campaigns and organizes meetings to "raise consciousness" (*conscientizar*) among affected communities (Gomez Fuentes 2015). This suggests a fundamental tension that underpins this movement - each struggle is to be built from the grassroots, but at the same time requires some form of outside intervention to channel this resistance into a coordinated effort. In a rich ethnographic account of the Parota case, Sabas Vargas (2012) traces the emergence of two local groups, one supporting construction of the dam and the other resisting it. He traces this division to historically rooted inequalities in control of land and water among different groups, and the ways in which these histories are remembered and narrated. This case speaks to the complexity of building a movement based on "local" resistance.

This tension between mobilization "from below" and through intervention from "outside" relates to what Fox (1996) argued about the "thickening" of civil society in rural Mexico. In the context of a political opening, he argues that there are three distinct pathways that can be followed in the formation of new institutions: they can be formed by autonomous

local groups, by co-production between local civil society and external organizations, or between local groups and state actors. Which pathway will be followed has to do with regional variation in political regimes, where some areas are characterized by a history of authoritarian rule while others have managed to maintain autonomous local institutions, and others fall somewhere in between. MAPDER's efforts clearly fall under the category of collaboration between local and external civil society organizations, which, Fox (1996: 1096) stresses, can buffer emerging local groups from repression but also risk morphing into a semi-clientelistic relationship.

#### Small, Private...Renewable? The Changing Face of Hydropower in Mexico

Although it has been more than twenty years since electric generation was re-opened to the private sector, it has taken some time for this new model to take off. Records kept by the Energy Regulatory Commission (CRE) - an entity created in the 1990s and accused by the National Front of Energy Workers of being "an apparatus of the World Bank" (*"Hidroeléctrica Privada"* 2011) - provide one way to track the progress of private hydropower. In September, 2014 they reported 69 active permits for such plants, close to half of which were approved just since the beginning of 2013 (see fig. 1).

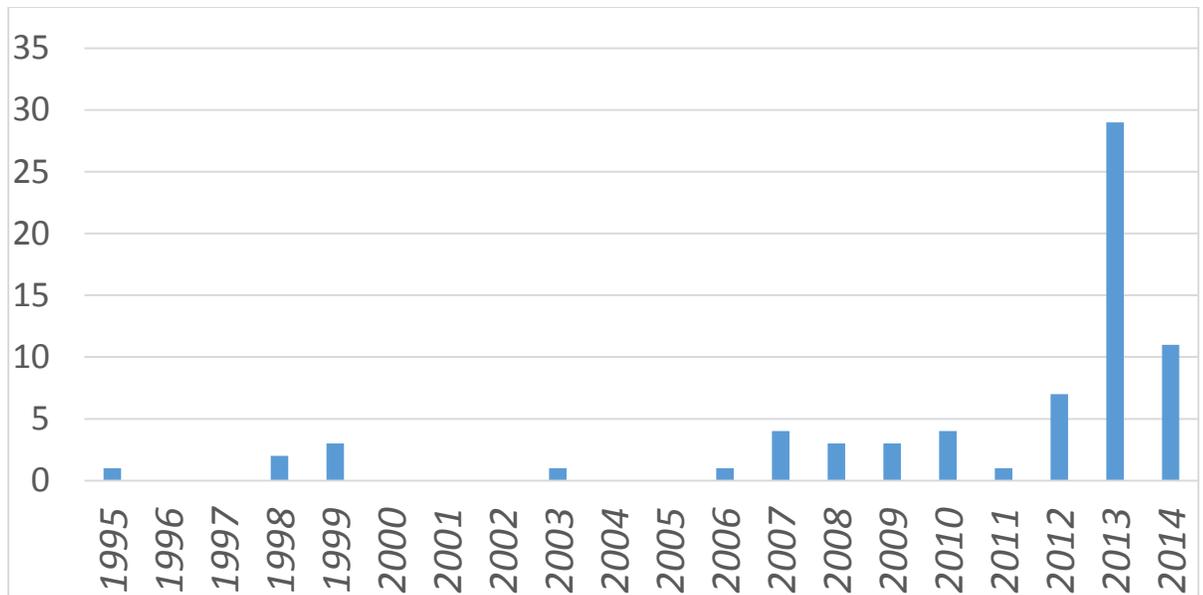


Fig. 1: Private hydropower projects approved in Mexico, by year. Based on permits for sale of energy issued by CRE, as of September 2014.

Tapping the potential of the nation’s “minihydraulic” power has been framed as part of a bright, democratic energy future in which production would be re-scaled from a system of big plants generating energy for the national grid to one where isolated rural communities, urban municipalities and industry would all be positioned to benefit from more cost effective, clean, locally-generated energy (CONAE 2000). Jacobo Mekler, president of an industry group called the *Asociacion Mexicana de Energía Hidroelectrica* (AMEH), in a 2013 interview reinforced the notion that hydropower will bring economic benefits to “remote regions where there are no jobs.”<sup>11</sup> However, this vision belies the reality of who is actually poised to benefit from these investments.

Two details about the relationship between private hydropower and the national electric grid are relevant to understanding this point. First, private projects can operate either under a “small production” or “self-supply” framework. In the former, a plant sells energy

<sup>11</sup> <http://www.imagen.com.mx/aprovechamiento-de-energia-renovable-con-energia-hidroelectrica>

exclusively to the CFE, while in the latter a plant contracts with specific customers who purchase its electricity (Huacuz 2005). The self-supply model is further divided into “local” and “remote” categories. The concept of local self-supply was embodied in the Porfirian-era hydro plants, which were located as close as possible to the site of consumption in factories and mines. In the remote self-supply framework, in contrast, electricity is first “injected” into the national grid and distributed to customers by the CFE.<sup>12</sup> Remote self-supply of electricity for manufacturing and extractive industries has become tremendously popular following privatization, growing at an annual rate of 32% between 2001 and 2010 (CFE 2012)<sup>13</sup>. This means that the potential of small hydro for fostering democratic localism espoused by the CONAE study cited above is largely fictional. Instead, these plants contract mainly with (and are often funded by) industrial users in distant sites of consumption, with the list of clients ranging from mining and ore processors, to airports, to Walmart stores.

A number of policy changes have been enacted to facilitate private investment in small hydropower. A 2008 renewable energy law (LAERFTE) creates incentives and tax breaks for these projects, defining small as 30MW or less. Interestingly, following pressure from AMEH, this limit was removed. Instead, a project is considered renewable if the ratio of energy produced to flooded area falls within a certain range. That is to say, the impact of hydropower is reduced to a single metric and future large projects can potentially operate under the framework created for small hydro - provided they do not have a reservoir with large surface area. This change, according to Mekler, will make investment in 1700MW of additional hydropower projects viable. As a renewable energy technology, hydropower also fits into the General Law on Climate Change, an ambitious policy rolled out in 2012 that

---

<sup>12</sup> Self-suppliers can sell electricity to the CFE and “bank” it for later use

<sup>13</sup> This figure is for all energy sources, not just hydro.

aims to raise renewables to 35% of the country's energy mix in the coming decade (Aleman-Nave et al 2014).

Along with changing the definition of 'renewable' to favor investment, water regulations have been modified to create an exception for small hydropower. A plan for low carbon development in Mexico developed by the World Bank encapsulates the "problem" perfectly:

"[development of small hydropower] is hindered...by the high level of uncertainty over water concession licenses...and over the availability of water once the plant is in operation, when the resource will be shared with other uses, such as fishing and irrigation. The schedule for resource sharing is determined by Conagua, which has traditionally given priority to non-power activities. This practice significantly increases the financial risk of hydropower projects and has discouraged private participation in small-scale hydro..." (Johnson et al 2009).

This issue was effectively resolved in 2011 through a presidential decree that modified the regulations that accompany the National Water Law to exempt projects of up to 30MW of the need to obtain a concession. In a memo explaining the decision, the director of Conagua noted that the previous policy was "failing to realize the potential of exploitation and sustainable use [of water], since it could not be destined for more than one productive activity" (Luege Tamargo 2011). The implication, of course, is that any "resource sharing" that puts a private hydropower investment at risk will not be tolerated.

Business practices of the companies behind these projects make it difficult to trace

the sources of investment in small/private hydro. Permits are often filed through shell companies or “*cajas chinas*” (Panico 2013) that reveal little information about the source of funding. But one project for which I have been able to find more information is illustrative of the trend in the kinds of arrangements that underlie this boom.

The project called Escalona - much more on this in the following chapter - was originally planned by the CFE and later taken over by a private company based in Mexico City. They are in turn funded by LEAF Clean Energy, a venture and growth capital firm officially based in Washington, D.C., but which lists its country of origin as the Cayman Islands on their application for CDM credits for this project. According to Tom, an investor at LEAF, a network of subcontractors, consultants, banks and private equity partners are involved in realizing the project. That is to say, the structure of this project is indicative of the shifting political economy of hydropower discussed in the previous chapter, where rather than being driven by a discourse of regional and national development, the new players are concerned primarily with the return on investment (Ahlers et al 2015). At a time when public outrage over violence and government corruption is mounting, investors like Tom “see a lot of positives [in terms of] Mexico’s ability to enforce the rule of law [and establish] quality government institutions” (Interview 3/6/2015).

As the landscape of small/private hydro begins to take shape, it is clear that these investments are not evenly distributed across the Mexican territory. As the map (figure 2) shows, many of these projects are concentrated in the central gulf region, in the states of Veracruz and Puebla - often targeting some of the same rivers where private hydropower was developed during the Porfiriato (see fig. 2). More than simply fulfilling the technical criteria for these projects, the rivers of this region have been constructed as an untapped resource.

The Mexican waterscape is frequently presented in terms of a supposed paradox of the economically advanced but water-poor center and north, contrasting with the water abundant but economically disadvantaged south and east (Whiteford and Melville 2002; Wilder and Romero Lankao 2006). This narrative is taken up as evidence of the necessity of expanding hydropower development in the Sierra Madre Oriental. As Paula, an environmental consultant who we will be hearing from again in the following chapter, put it, “thirty percent of the water that falls on this country runs through Veracruz and ends up in the Gulf of Mexico...dirty and full of pollutants...Let’s use it! But we must know how to use it properly.”

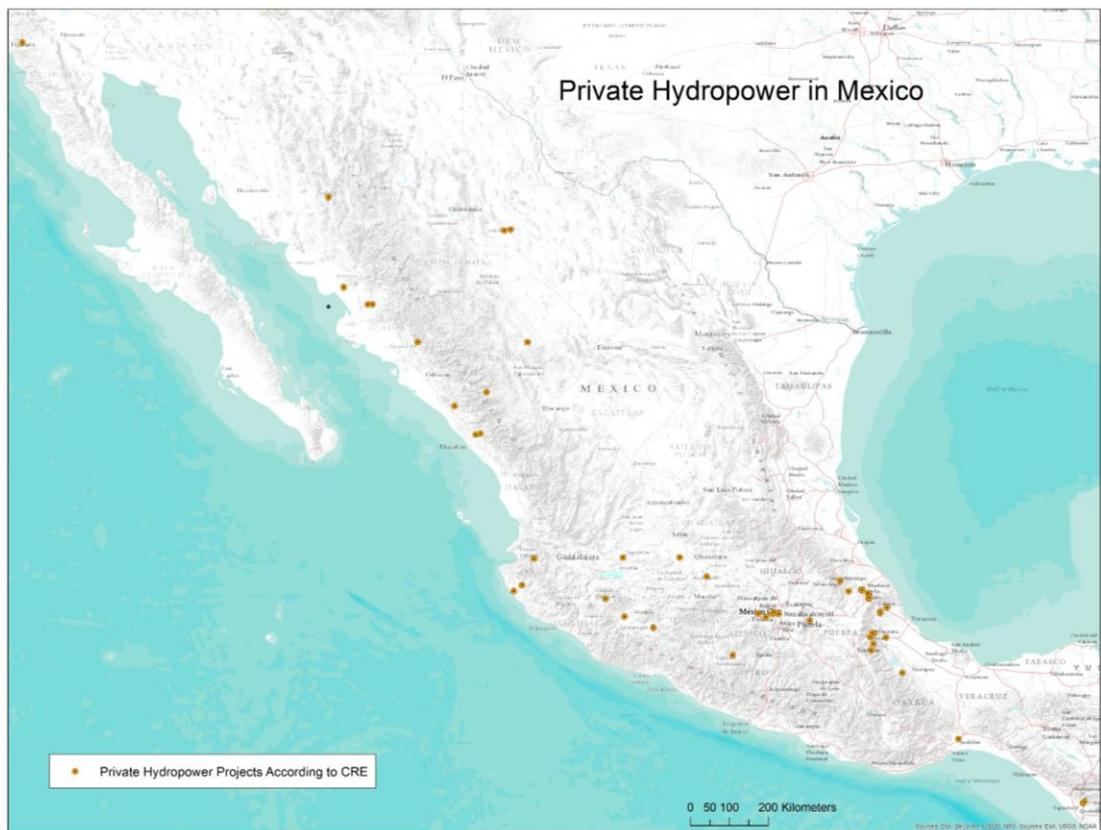


Fig. 2: Map of private hydropower projects in Mexico. Locations based on descriptions in CRE permits. Permits with no location specified omitted. Some locations approximated based on municipality. Map by author.

## Chapter 5 - The Bobos-Nautla: Making Space for Hydropower

Not three days after beginning the fieldwork for this project, I got in touch with Carlos, a former congressman (*diputado*) from Tlapacoyan in central Veracruz. “Meet me at the bus station tomorrow morning,” was the outcome of our first brief conversation. Later the following day we stood atop a hill overlooking the Filobobos River at the approximate site of a proposed dam. As he and his companions from a group calling themselves the *Alianza de Comunidades Usuarios del Rio Bobos* (Alliance of User Communities of the Bobos River - the *Alianza* from hereon), prepared for a meeting in the community of Texcapa, Carlos reflected that “it seems incredible what we are about to tell them.”

The projects that would be the subject of that afternoon’s meeting had only come to light a few days earlier with the publication of Environmental Impact Assessments, and most of the people in the meeting would be hearing about them for the first time. As I was quickly learning, plans for hydropower projects in this region change quickly and tracking their movement is no small task. Following Carlos and the *Alianza* around the basin, I began to trace the connections that are being mobilized to both make these projects possible and to contest them. This process led me to remote communities in the canyons and mountainsides of the *sierra* of the upper basin, to drab government offices, and into a thicket of often highly technical documents.

Although I introduced my methods earlier, some comments are in order to help illuminate some of the methodological challenges that I faced in this research and how I have navigated them. My relationship with Carlos and his allies - which began through an introduction by Vicente at the Mexican Center for Environmental Law (CEMDA) - shaped my fieldwork experience in important ways. On the one hand, through him I gained access to

people and situations that would have been otherwise unreachable. On the other hand, he seemed to view himself as a gatekeeper for my research and would try to control my schedule and who I spoke with. This relationship made it difficult to access some pro-hydropower and more moderate actors, and made it difficult to gain trust when I was able to reach those people.

This challenge carried over to the time I spent in the communities of Epapa and El Mohon, where I entered the community through an introduction to Elena, an outspoken critic of the hydropower projects. She too acted as a gatekeeper, helping me gain trust with her friends, family and political allies, but also attempting to limit communication with those outside her network. After an attempt to speak with the *agente municipal* in Epapa, she told me that, in the future I should let her know who I plan to talk to so that she could tell me “what kind of person (*que clase de gente*) they are.” The *agente*, for his part, accused me of being part of the group of environmentalists that were stirring up trouble in the community, and accused Elena of profiting from the conflict (citing my presence as evidence of this).

This dynamic posed a significant challenge for my fieldwork. Suspicion of my motives was, at times, only implicit, and at other times overtly stated. On several occasions, I was told by members of the activist network that some people thought I was a “spy” - presumably working for a foreign investor. In interviews with government officials, I could often detect a similar attitude. In an interview with a Conagua official, whom I quote in the next chapter, he became highly defensive when I started asking detailed questions about specific projects. At the end of this tense interaction, I concluded the interview by asking if he had anything else to add, to which he responded, “I’d rather not say anything, if you’re just going to use it against me.”

These issues of positionality are not simply a challenge to be overcome, but a constituent part of my research process. The difficulty that comes with asking questions about a contentious issue, and doing so while being conspicuously foreign, inevitably shaped who I was able to talk to and what they were willing to tell me. Particularly during the time I spent in the communities of the Bobos-Nautla basin, this meant following the suggestions of my initial contacts, Carlos and Elena, as to whom I should speak with and where I should go.

These relationships gave me access to meetings and conversations that were invaluable for my understanding of the micropolitics that surround the hydropower projects. An off-hand comment that I made to Carlos early on, that my research concerned “water governance,” led him to put me in touch with community water management committees. While I was initially uncertain of the connection between these groups and the politics of hydropower development, I began to see, as I argue in chapter 6, that the history of autonomous water management is intimately connected with the reaction to these projects. This understanding only developed because I followed the connections that were made available to me. A different story would no doubt have emerged if I had taken a different approach, such as systematically interviewing people in communities along the entire path of a proposed project. Although I had initially hoped to do this, the difficulty of gaining trust without an introduction from a personal connection (or even with one!) made this idea impracticable.

These challenges also led me to pursue other avenues to gather information. For example, while the response time to my request for an interview at Semarnat was longer than my time in the field, I came to realize that many documents pertaining to the environmental permitting process were readily available and likely offer the basis for a richer account than

an interview with a bureaucratic functionary in any case. Likewise, my turn to archival sources was, in part, a reaction to the challenge of constantly having to reckon with my positionality and issues of self-presentation. Entering the archive allowed me to follow conflicts over hydropower development in the Bobos-Nautla from a less immediate perspective. Of course, archives privilege certain voices and silence others, but the material that I uncovered there seemed to put at my fingertips a wealth of information and perspectives that equaled what I had learned about the current conflicts in several weeks of fieldwork. At the same time, knowledge that I had gained from spending time in the basin helped me filter and understand what I was finding in the archive. In turn, the parallels between the stories held in the archive and the material I was gathering “in the field” gave me new insights into the latter, which I elaborate below.

In the following chapters, I piece together the story that emerged from this experience. It is divided into two parts - first, a history of hydropower in the Bobos-Nautla basin as viewed through formal plans, legal battles and bureaucratic correspondence. In the second part, I focus on the movement forming to oppose these projects and the imbrication of hydropower with micro-political struggles over the meaning of nature, water and property. This general division is not steadfast - in the first part I also draw on comments and reactions by Carlos and others to these formal processes, and in the second I draw connections between extralegal conflicts and the plans, laws and property regimes that are being contested.

#### **Grand Schemes and Local Dreams: Early Hydropower in the Bobos-Nautla**

During that first meeting, Carlos mentioned in his speech a tunnel built in 1888 to supply water to the city of Tlapacoyan. At the time, this detail stood out for its incongruence.

Interesting, but why mention it in this context? As I would come to understand, the tunnel is not only enmeshed in the current controversy over hydropower projects but was also at the center of a similar conflict that began over a century ago. Examining this history shows that the Bobos-Nautla's trajectory as a hydropower basin is deeply rooted. This history also shows that competition, speculation - and failure of ambitious plans - in this basin is not new. Communications preserved in Mexico City's *Archivo Histórico del Agua* (Historical Water Archive) between bureaucrats, capitalists, and local politicians and businessmen speak to the complex negotiations that determine not only how a river can be used and by whom, but also to define what the river is.



Fig. 3: A diversion in the Tomata River that leads to Tlapacoyan's tunnel, built in 1888. Photo by author, August 2014.

The story of hydropower in the Bobos-Nautla begins in 1901, when one Andre Lefebvre - likely French<sup>14</sup> - asked the SAF for a concession for waters of the Jalacingo River, “using all the power that the total volume of its waters could produce.”<sup>15</sup> Responding to concerns from the SAF that this would constitute a monopoly and could deprive others of

---

<sup>14</sup> His nationality is never specified beyond references to his being European

<sup>15</sup> I cite these documents according the AHA's classification scheme; All translations are my own. *Aguas Superficiales* 4264, 57041

water for irrigation, Lefebvre sent a letter allegedly signed by local landowners declaring that the waters are not used because they are “salty.”

Lefebvre was well aware of Tlapacoyan’s tunnel, which cuts from the Tomata River<sup>16</sup> to an adjacent *arroyo*,<sup>17</sup> filling this otherwise dry wash with an abundance of water that feeds into the city’s distribution system. At various points he considered using the arroyo for additional hydropower, or as part of a flood control scheme for the larger project. This plan was complicated by questions about property rights surrounding the *arroyo* - not, in this instance, whether Tlapacoyan has a right to continue its customary use of which the SAF was ostensibly ignorant, but whether its waters were subject to federal control. After studying this question, the SAF concluded that once removed from the Jalacingo the waters of the arroyo were beyond federal jurisdiction<sup>18</sup> and for this reason could not be ‘concessioned’ to Lefebvre.<sup>19</sup>

After a setback occasioned by being “violently uprooted” by the landowner of the site where his engineers were camped, Lefebvre’s plan began to take shape. In a letter dated March 18, 1904, he concludes that the different rivers “are not susceptible to independent development, and only uniting them artificially will it be possible to use them.” Construction began in 1905 and then abruptly stopped as Lefebvre ran into financial difficulties, returning to Europe to seek the capital to continue.

Following the collapse of Lefebvre’s project, competition for the waters of these rivers became more intense. Picking up on the idea to use the arroyo for hydropower in 1921,

---

<sup>16</sup> A local custom that is quite evident throughout these documents is to refer to a river by multiple names along its course. The Tomata is the name that the river takes at the confluence of the Jalacingo and the Alcececa.

<sup>17</sup> It is referred to by the following names: Rio Tunel, Itzapa, Atehuetzin. Here I call it simply “the arroyo” for simplicity’s sake.

<sup>18</sup> This is 1902. At some point the concept of jurisdiction is no longer used, not sure if this is still an accurate term to use here, but I think it is, prior to the 1910 water law.

<sup>19</sup> AS 4521, 59909

a local family business called *Núñez Hermanos y Cia.* requested a concession to use excess water that was not diverted to Tlapacoyan's water supply. "Previously, Mr. Secretary," they write, "these concessions were truly a windfall [*canongia*] for the privileged. But today with a Progressive Government we all feel filled with faith to launch businesses, as difficult as it may be."

The questions raised by Lefebvre's plan to use the arroyo continued to haunt the negotiations over this project - was it legally part of the Jalacingo River, or separate? In either case, was it federal property? At one point in this correspondence, the SAF suggested asking the governor of Veracruz about ownership of the arroyo, noting the existence of a tunnel there "built in time immemorial"<sup>20</sup> - of course, it was built only forty years earlier. These questions were echoed again in 1933 when the SAF called for an inspection of the arroyo to determine "the property to which its waters belong."<sup>21</sup>

While the Núñez brothers were working to build a plant to illuminate the city of Tlapacoyan and power small grain and sawmills in the area, the grand scheme conceived by Lefebvre was taken up by another foreign investor. As soon as Lefebvre's water concessions were finally extinguished in 1923, Thomas P. Honey - a British financier with interests in railroads and silver mining - requested the rights to the same rivers.<sup>22</sup> Informing the SAF of the 'importance' of the proposed works - one of the criteria for granting a concession - Honey writes:

"...given the cost, they will of necessity be important; upon completion they will provide jobs to innumerable operators, employees and professionals, and the entire

---

<sup>20</sup> AS 4266, 57045

<sup>21</sup> If such an inspection was indeed ever carried out, I have not been able to locate its results.

<sup>22</sup> AS 4202, 56655

region in which the Company develops its activities will inevitably improve. The mere enunciation of the number of horsepower to be developed [36,000], gives a clear idea of the importance of these works, as well as their general utility as much for the region of the State, as for the Country.”

Where any opposition to Lefebvre’s project - save the confrontation mentioned earlier - is not recorded in the archive, Honey’s attempt to develop these rivers set off a flurry of well-documented complaints. Among Honey’s opponents are Lefebvre himself, the Núñez brothers, and the municipality of Tlapacoyan.

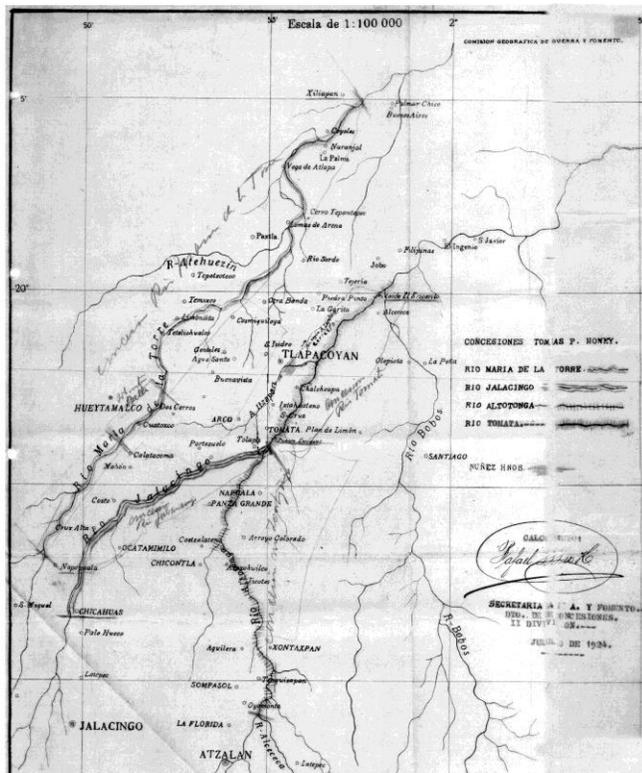


Fig. 4: Map of river sections ‘concessioned’ to Thomas Honey and competing claims, 1924.

The *Junta Civil* in Tlapacoyan wrote to the SAF in 1924, informing the agency that in the same stretch where Honey’s concessions have been granted “this municipality

constructed a great tunnel at the cost of lives and interests of the same,” and asking for confirmation of their “prescriptive right” to 1500 liters/second<sup>23</sup>. The ultimately unsuccessful effort to have this right officially recognized spanned several years. Since all documentation pertaining to the tunnel was lost in a fire in 1917, the SAF informed Tlapacoyan that it would have to request a new concession rather than a confirmation of existing use. Negotiations between these two parties proceeded to the point of drafting a contract that only needed the signature of the mayor of Tlapacoyan to be validated.<sup>24</sup>

A reduction of the volume of water granted from 1500 to 200 liters per second went unnoticed by the mayor - one Policarpo Méndez - but he was incensed that the contract stated that this was a request for a new concession, and insisted that it be modified to reflect the city’s long-standing use of these waters. Obliging this request, the SAF threw out the contract and informed Tlapacoyan that it would have to provide sworn testimony of the tunnel’s history. Despite protestations over the financial and logistical burden of having a judge travel to Tlapacoyan to complete this task, the testimony was delivered in 1927. Once again, Tlapacoyan’s rights appeared to be on the verge of official recognition. This time, defeat is snatched from the jaws of victory by removing the municipality from the negotiation and allowing the state government to take over on its behalf, where the case gets lost.

Meanwhile, despite Honey’s apparently advantageous position over his opponents, his project did not proceed as planned. A surprising development took place in 1926, as the SAF suddenly asserted that another investor, Robert B. Brinsmade, held a claim to the waters of the Jalacingo that pre-dated Honey’s.<sup>25</sup> Little else is preserved of this claim and

---

<sup>23</sup> AS 4273, 57114

<sup>24</sup> All of this from AS 4889, 68217

<sup>25</sup> AS 4273, 57112

Brinsmade's intentions, but this hitch appeared to doom Honey's project which quickly faded from view.

It is no small irony that the only hydropower project to actually come to fruition during this period is the Núñez Brother's small plant on the arroyo, which generated power for Tlapacoyan from 1926 until its water rights were extinguished in 1964, following nationalization of the electric industry.<sup>26</sup> And it was the tunnel, that so confounded bureaucratic categorization, which delivered the water to fuel their plant. Rather than the visions of domination of a wild river advanced by Lefebvre and Honey, the arroyo with its coexisting water supply and modest hydroelectric plant appears more like what *Henri* Lefebvre calls "appropriated space" - "natural space modified to serve the needs and possibilities of a group" (1991:165). A letter from the Núñez Company to the SAF in 1931 illustrates what a distinct position they assumed in official communications from that of the foreign investors. Referring to a mistake in the paperwork related to their water concession, they pleaded with the SAF that,

"...in these towns we do not have competent people with whom we can consult...If we have committed errors it has been out of ignorance...You cannot imagine, Mr. Secretary, how many sacrifices, how many deprivations![sic] this company has cost us, so superior to our own strength, but we have been motivated by the spirit of advancement and progress so that the Mexican effort may stand out."<sup>27</sup>

---

<sup>26</sup> This plant, like many other private hydropower plants that were built prior to nationalization was allowed to continue to operate until the original terms of its water concession came to an end. In this case, the Nunez company fought for an extension, but they were denied.

<sup>27</sup> AS 4266, 57045

In the 1950s, the CFE began to make its presence felt in the basin through the construction of two projects - Las Minas and El Encanto, at the upper and lower extremes of the stretch of the river that is technically feasible for hydropower. That some within the CFE envisioned a greater role for these rivers is evidenced by a 1953 declaration of the basin, including “all of its rough and calm waters” as a “National Reserve of Hydraulic Energy.” Although the thin file pertaining to this designation offers few clues as to the thinking behind it, the fact that the Bobos-Nautla was the only basin in the country to receive this label<sup>28</sup> suggests that some within the CFE conferred a status of importance on this river.

How do these past plans and designations continue to shape the trajectory of hydropower development in the Bobos-Nautla? For one, the tunnel and the historical memory of the labor that produced it persist, even if the specifics of the conflict at the turn of the century are largely forgotten. Carlos recalled when Tlapacoyan’s right to the tunnel was formally recognized in the 1950s and that people from his parents’ generation still remembered hearing about the arduous labor that their grandparents contributed to its construction. In the 1920s, as now, the tunnel evokes this memory and becomes a site where conflict over what the river is and who it serves is concentrated.

These negotiations and plans also play a role in territorializing the basin as a site of hydropower potential. Even as earlier schemes are forgotten, each one seems to play some role in the subsequent effort - Lefebvre’s initial survey sets the boundaries for Honey’s claim, which is then worked out in detail, and mapped, defining the unrealized potential of these rivers. Whether the CFE knew of these earlier plans or not, its demarcation of the basin plays some role in creating an imaginary of the basin as a ‘reserve’ - a site for future

---

<sup>28</sup> At least, a search in the AHA turned up no other files with this term.

development - which is taken up again four decades later.

### Fragmented Hydropower Planning and the Production of 'Magic Numbers'

How many hydropower projects are currently planned in the Bobos-Nautla basin? Such a simple question evades a simple response. Before beginning my fieldwork, Vicente from the *Centro Mexicano de Derecho Ambiental* (CEMDA) mentioned plans for 112 hydropower projects in the state of Veracruz. "Where did this number come from?" I asked. "The 112 projects," he told me, "are like a magic number. Everyone talks about them but no one knows where they came from." Despite the fact that I can now trace this number to its apparent source - a 1995 study by CONAE (National Commission of Energy Saving) - this is just one of many 'magic numbers' that circulate around hydropower projects in the region. Rather than treating any one source or utterance as the truth about the plans for the basin, here I draw on multiple sources to show how these magic numbers are constructed, and how they circulate.

Following the declaration of the upper Bobos-Nautla as a Reserve of Hydraulic Energy, and the two CFE projects completed in the 1950s, hydropower planning in the basin was quiet for several decades. In 1994, with interest in small hydro growing again following the partial privatization of electric generation, the CFE initiated a *Gran Visión* (Grand Vision) study of the basin, identifying just seven potential projects (CFE 1996). One of these, "Las Minas II," was quickly elevated to the 'pre-feasibility' level of planning. Later, it would be taken over by a private company and re-named Escalona. Ricardo, the CFE engineer who led the Grand Vision study, lamented that this project and others were "stolen" from them by private investors (Interview 7/15/14).

The 1995 CONAE study that identifies 112 projects in Veracruz proposes 17 for the Bobos-Nautla - ten more than the CFE plan. What explains the difference between the CFE and CONAE visions for this river? According to Ricardo, the *Gran Visión* for the Bobos-Nautla marked a new phase for the CFE in which planning is meant to be more “integral,” with biologists and anthropologists contributing to decisions about which projects to pursue. Even though the study, as he put it, doesn’t contain a lot of detail, one outcome of this was that projects within protected areas - as well as some deemed economically unfeasible - were removed from their list. In contrast, the only criteria used in the CONAE study are topography, hydrology, and the viability of investment.

A study done in 2010 by a group of CFE engineers experiments with new GIS-based techniques to identify sites for small hydropower, concluding that the Bobos-Nautla contains an astounding 274 potential sites (Garcia Ortiz et al 2010). Although the authors clarify that this is meant merely to identify “[river] sections with potential based on a continuum of flows and not specific projects,” this document is accompanied by a map of the basin that, to all appearances, seems to contradict this claim by identifying specific projects (fig. 5). A low-resolution version of this image features prominently in Carlos’s speeches where he cites it as evidence that 24 projects are planned in the Bobos-Nautla. Despite his claims that the image was leaked by a government contact who lost his job for this furtive act, I was able to obtain a copy by filing a request through the government’s online information system ([www.infomex.gob.mx](http://www.infomex.gob.mx)). However, even upon close inspection, it is difficult to tell exactly how many projects are identified.

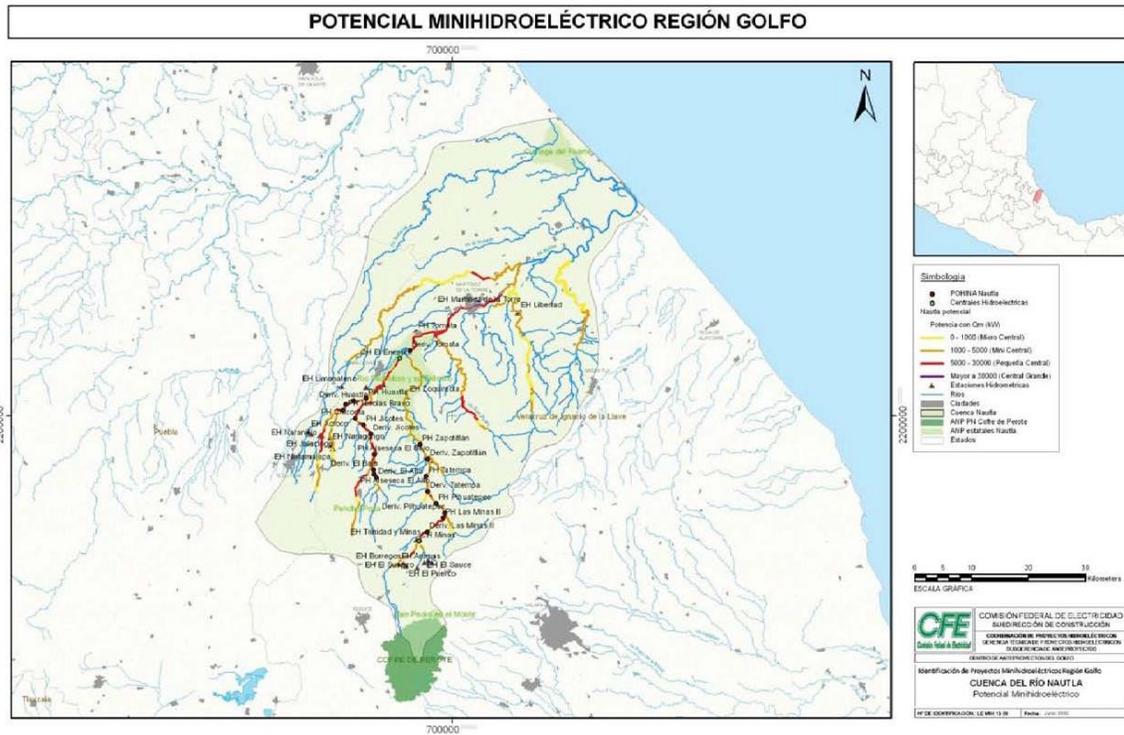


Fig. 5: “Minihydroelectric Potential of the Gulf Region.” From Garcia et al (2010).

Still, “24” has become a magic number for the Bobos-Nautla. Early in 2015, when environmental impact statements for a set of four projects were rejected, journalists reported - with no source given - that they were among 24 which that particular company intended to develop<sup>29</sup> in the basin. In addition to the fifteen projects with Environmental Impact Statements on file, rumors continually circulate about ‘land traffickers’ buying up sites for future projects, as in the vignette in the introduction, further unsettling any stable accounting of the plans for the basin.

29

[http://www.notiver.com.mx/index.php/primera/301104.html?secciones=3D3&seccion\\_selected=3D3&posicion=31](http://www.notiver.com.mx/index.php/primera/301104.html?secciones=3D3&seccion_selected=3D3&posicion=31)

<http://eleconomista.com.mx/estados/2015/01/14/alistan-tres-proyectos-corte-hidroelectrico>

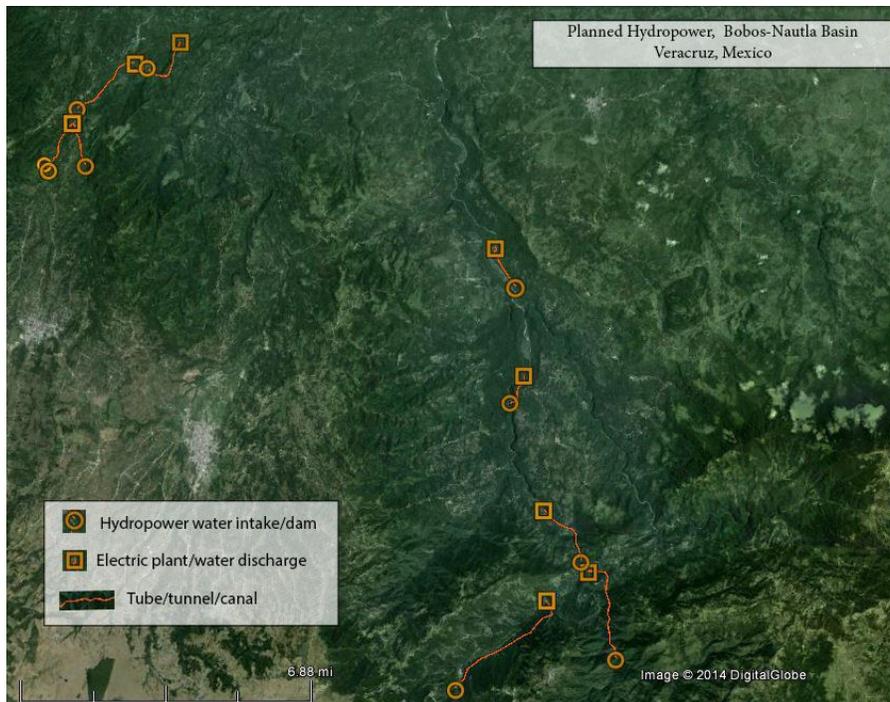


Fig. 6: Map of proposed hydropower projects in the Bobos-Nautla basin (Jalacingo River on the left, Filobobos and tributaries on the right), based on Environmental Impact Statements.

### Which Government? The Contradictions and Ambiguities of Environmental Permitting and Regulation

Analyzing Environmental Impact Assessments - which I refer to by the Spanish initials MIA<sup>30</sup> - for projects in the Bobos-Nautla illuminates the highly contested formal decision-making processes that surround hydropower in this region. Since oversight of water use for small hydro has been effectively removed, and energy policy is geared towards maximizing development, environmental policy is the arena where decisions are more visible and outcomes appear less pre-determined - even if public participation in this process is seen by many as “a farce” (Vicente, interview, 8/12/14).

Although the available documents are often incomplete, convoluted, and

<sup>30</sup> *Manifestacion de Impacto Ambiental*

contradictory, my aim is not to catalog these inconsistencies. Rather, I seek to trace the political life of particular details contained within these studies. The negotiations that are captured in official documentation between private companies, Semarnat (Secretary of Natural Resources), and various authorities from different levels of government, offer a glimpse into how environmental laws and regulations are interpreted, modified, and circumvented in relation to hydropower. Furthermore, the text of the MIAs offers insight into the discursive strategies of otherwise reticent companies, which are then interpreted and invoked in counter-claims made by opposition groups.

In this section, I follow a particular regulation that has been highly controversial in the environmental permitting process in the Bobos-Nautla. The *Ordenamiento Ecológico del Territorio* (literally, ecological ordering of territory, *Ordenamiento* for short) is, according to Paula, an environmental consultant who oversaw the plan for the Bobos-Nautla, “the most important instrument for planning land use” in Mexico (Interview 7/1/14). Before digging in to how this “instrument” has been contested in relation to permits for hydropower projects, some comments on the content of this law and the process of its production will help set the stage.

The *Ordenamiento* for the Bobos-Nautla was the first in Mexico to be undertaken at the scale of a river basin (Daniel, interview 6/30/14). The goal of an *Ordenamiento* is to partition space according the “territorial aptitude” of different areas - “if it is best for cattle, or agriculture, or it just isn’t useful for anything and you have to protect what’s there, biodiversity or services” (Paula, Interview 7/1/14). These areas are later assigned an “ecological policy” - use, conservation, protection or restoration - at which point they become known as Units of Environmental Management, or as Paula put it “the famous

UGAs.”

After becoming law, the *ordenamiento* is supposed to be overseen by a committee that includes representatives from government, civil society, academia and “productive sectors.” In the case of the Bobos-Nautla, this committee ceased to function after debate about hydropower projects “turned into a show for the environmentalists,” according to Julia, the head of the office for *Ordenamiento* in Veracruz’ Secretariat of Development and Environment (SEDEMA). The problem with this law, from her point of view, is that municipal governments lack the technical capacity to understand and apply the regulations, and often aren’t even aware of its existence. Paula pointed to another root of this conflict:

“supposedly, in the planning workshops PEMEX and CFE...are obligated to tell us ‘I want to put a gas line here,’ or ‘I want to put a hydroelectric plant here’...If they don’t tell us, the *Ordenamiento* doesn’t take it into account and we might put a protected area where they want to put a hydropower project and they will have to fight over it...but I think they have learned that it’s better to tell us than to hide information. Well, not always...”

A comment from Joaquin, a *regidor*<sup>31</sup> in the Municipality of Tlapacoyan, helps frame the controversy that has unfolded over the role of the *Ordenamiento* in decision-making about hydropower in the Bobos-Nautla. Though he had never heard of the law when I asked him about it, he responded by saying, “but they haven’t been respecting it - which government? Which of the governments has been ignoring it?” As we trace the life of the

---

<sup>31</sup> Similar to a city council member

*Ordenamiento* though the MIA process, this is a question that will continue to resonate. Controversy about the role of municipal, state and federal authorities in enforcing or ignoring the *Ordenamiento* is a consistent thread in this narrative.

### Part 1: Clearing the Path

“With Escalona,” Carlos told me, “you have a whole history. It’s the original debate in the state.” (Interview 7/14/14). Escalona’s appearance in the *Gaceta Ecológica* - Semarnat’s periodical that announces the submission of MIAs - in 2006 set it on a collision course with the *Ordenamiento*, which was, in Carlos’s words “*fresquecito*” (very fresh) following approval in 2004. The first version of Escalona’s MIA barely mentions the *ordenamiento*. In response, the DGIRA<sup>32</sup> in Mexico City argues that the project is within UGAs 2 and 8, “natural space” and “restoration,” respectively, both of which consider infrastructure an “incompatible use.” UGA 8, the restoration zone, importantly, corresponds to a narrow riparian stretch along the rivers. This dispassionate technical designation, then, conceals a conflict that is really about the space of the river - who has the authority to make decisions about it and how is this authority enacted?

In detailing its objection, the DGIRA notes, without acknowledging the contradiction, that those zones both prohibit construction along river banks and require that any project that dams a river be accompanied by studies of hydrology and sediment, going on to say that:

“Even if it is true that the **project** does not imply the construction of infrastructure to dam the Minas river, it is also true that it will require diversion of a quantity of the

---

<sup>32</sup> (the branch of Semarnat charged with reviewing MIAs)

hydrologic flow of the river...which will affect the environmental conditions [between the intake and the outflow].” (emphasis in original).

This comment introduces an important point of contention for projects in the basin - the company is attempting to skirt restrictions on infrastructure by claiming that a small hydro project with a diversion scheme does not count as a dam. In rejecting the project, the DGIRA also informs Escalona that it may re-apply, presenting the “technical, juridical and administrative arguments” as to its compatibility with the law. As Carlos said, “here they are applying the *Ordenamiento* violently...but even in the negative response they leave the door open a crack [*les da la salidita*].”

In response, the second version of Escalona’s MIA, submitted later the same year, presents a full-blown legal argument challenging the very validity of the *Ordenamiento*. Here Escalona argues that this law infringes on the “freedom of business” (note the echoes here of arguments made in response to early regulation of hydropower in the 1920s). Such regulation, they argue, can only be valid if approved by a legislative body, but the *Ordenamiento* was declared by the governor’s office. It is, in their view, “merely indicative for private parties and obligatory only for the public sector.”

Escalona also introduces arguments that appeal to “sustainable development,” pointing out that they have proposed a mitigation plan that involves development of a “private conservation area” in partnership with the municipal government of Las Minas - a project that they argue is very much in keeping with the “ecological criteria” of the *Ordenamiento*. In contrast, the site where the project will be built “is on lands on which there are already anthropomorphic [sic!] activities [including] forestry and agriculture.”

Responding to Escalona - but, intriguingly, referring in several places to the CFE as

the project promoter - the DGIRA now opines that because the proposed “measures of prevention and mitigation” are “not limited to the activities of the project, but...cover larger regions,” it should be considered compatible with the policies of protection and restoration. In reference to the pesky categorization of infrastructure as an incompatible use in those zones, they posit that: “This restriction is based on the premise of protecting and restoring those zones...to a state of good conservation and to restore the river channels...however, this premise is not applicable to the site of the project, as the works will be completed on previously impacted areas.” (p. 10).

Not only does this represent a complete reversal of the earlier decision, but notice too that the DGIRA is not simply repeating statements made by the company, but re-working those arguments according to its own logic. Restoration of natural areas here is only applicable to areas whose “deterioration” is due to a “natural” cause. Places that are impacted by human activity are then exempted from any possibility of restoration - they are already unnatural.

An opinion appended to this document from a different branch of Semarnat<sup>33</sup> (DGPAIRS) continues to assert that the project is not compatible with the *Ordenamiento*, to which the DGIRA responds that the company has proved that the project is “compatible with the objective” of the law. In another reversal, SEDEMA, which in the first resolution issued an opinion stating that the project was in violation of the *Ordenamiento* is now quoted as saying that it “is viable...as long as the measures of mitigation, restoration and compensation are carried out.” The decision this time is to grant approval of the project with the condition that these measures must be carefully documented. Julia, the head of SEDEMA’s

---

<sup>33</sup> Environmental Policy and Regional and Sectoral Integration

*Ordenamiento* desk, insisted that her office had no say in whether a project is approved or not. “Besides,” she told me, “the *Ordenamiento* can’t decide everything. This is a federal decision” (Interview 7/3/14).

According to Carlos, this negotiation became a point of reference for future projects to see what arguments could be made. “This is like a historical document that many have used to know how to get in - you’ve got to follow the road of Escalona.” Not only do later projects borrow the same text, but they also refer to the precedent established by approval of Escalona. The Dos Puentes<sup>34</sup> project, in its 2011 MIA, argues that since hydropower projects have already been approved up and downriver from their proposed site (Escalona and Tatatila, respectively), this alone proves that hydropower is in compliance with the *Ordenamiento*.

Despite gaining approval on its second attempt, Escalona went through a third round owing to delays in construction. The text of this final MIA in reference to the *Ordenamiento* remains the same, but the response of the DGIRA is changed in one important way: the reference to infrastructure as an “incompatible use” is erased entirely. The reason for this is that in 2008, the criteria for “UGA 8” was changed by the state legislature to shift “infrastructure” from the “incompatible” to the “conditional” category.<sup>35</sup> Carlos’s interpretation of this situation helps shed light on what is not captured in the documents:

“Escalona complains to the governor, ‘hey, you invite me to Veracruz and you don’t make it easy [no me da facilidades].’ So the governor accuses his secretary of environment of putting up obstacles, and the government thins out [the

---

<sup>34</sup> P. 44. 30VE2011ED106

<sup>35</sup> Versions of the UGA criteria from 2004 and 2008 confirm this.

*Ordenamiento*]...but congress didn't follow the ritual that the law asks of them, because the state law says that they must have the opinion of the municipalities to change the *Ordenamiento*. So what they did was completely cut out the municipalities.”

With this seemingly minute change of moving a word from one column to the next in a regulation that is already a sea of numbers, codes, and tables, the Rio Bobos and its tributaries - remember, UGA 8 follows the rivers - now seems to be fair game for hydropower projects. Even though Escalona was previously approved with this obstacle in place, the arguments needed to justify approval would seem to be much simpler. However, this situation is far from resolved.

## Part 2: Complications

Following the ultimate triumph of Escalona in the MIA process, three more projects were approved in the basin using the same arguments (Tatatila, PH1, and PH3). The negotiation over PH1, in 2009, introduced several additional strategic ploys to exempt projects from oversight of the *Ordenamiento*. Referring to the requirement that dams (*obras de represamiento*) must be accompanied by studies of hydrology and sediment, the company's position is that the project “does not imply construction of a dam...[and that] the intake for PH1 is of the grate type [*tipo rejilla*], which has the quality of taking and conducting water in the flow of the current<sup>36</sup> without damming.<sup>37</sup>” Further, in response to the

---

<sup>36</sup> The phrase used here is “al hilo de la corriente.” Al hilo de agua is usually translated as run of river, but it also carries an implication of a trickle of water.

<sup>37</sup> Here, Carlos's reading of the documents differs from my own. He claims that by invoking the *rejilla* companies deny that their projects should be considered infrastructure. I haven't seen this exact claim...yet.

rule that “infrastructure of permanent materials in protection areas is not permitted,” the company argues that their project should not be considered permanent because it is only planned to operate for a set period of time - in this case at least 50 years, with the possibility for extending to 75 or 80. Both of these arguments are accepted by the reviewers.

At this point, there would seem to be a straightforward precedent for approving hydropower projects in the basin. However, this dynamic takes a surprising turn with the introduction of the Ocampo-Cuetzalin project in 2010. The response by the DGIRA to this project is a return to what Carlos refers to as “applying the *Ordenamiento* with extreme verticality.” In this document, Carlos and Elena, another member of the *Alianza*, figure quite prominently in the text with comments they submitted through the procedure for public consultation reproduced at length.

Among their objections are vacillation over the nature of the project, “at times managed as infrastructure, and others as offering services to the electric industry”; failure to indicate the effect of the project on environmental flow; omission of the impact of transmission lines; and omission of the existence of a water source for the community of Epapa near the project site. Prior to issuing its opinion on the project, the DGIRA requested additional information from the company related to these points and others, including technical characteristics of “the infrastructure called *fosa con rejillas*” (pit with grate), “technical-scientific analysis” demonstrating that environmental flows would be maintained, a study of the “final disposition” of sediment accumulated at the project site, and an analysis demonstrating that the project is “coherent with the policy of Restoration” - this last point is in reference to the *ordenamiento*.

Here we see another reversal of the interpretation of this regulation. In this instance,

the DGPAIRS and the DGIRA swap roles, with the former concluding that the project is in compliance with the *Ordenamiento*, while the latter now interprets the term restoration much more broadly: “UGA 8 and 9 are **Restoration...and should be restored to recuperate important habitats...the Project** is not focused on the recuperation of said habitats” (p. 16, emphasis in original). They go on to criticize the company for minimizing potential impacts on cloud forests in the area and that their “measures of environmental compensation” are “not in accordance with environmental policy since they are focused on the design of the **Project.**” This particular conflict connects a host of issues that continue to swirl around the politics of hydropower in the Bobos-Nautla: the question of environmental flows and impact on community water sources, the relationship between forests, “restoration”, and flows of water and sediment — each of which I will take up in due course in the following chapter.

The rejection of this project was not the only victory for opponents of hydropower in the Bobos-Nautla in 2011. Along with objections presented through Semarnat’s internal process, activists with the *Alianza* presented a “Constitutional Controversy” (from hereon, the *Controversia*) challenging the validity of the MIAs for PH1 and PH3 - which are part of a complex of projects on the Jalacingo along with Ocampo-Cuetzalin. According to Vicente, a *Controversia* is based on a claim that “one authority has invaded the sphere of competency” of another. In this case, the claim was that Semarnat “did not respect the right to *audiencia* (consultation)” of the municipality of Tlapacoyan (Interview 8/12/14). Joaquin, from the municipal government of Tlapacoyan, instead of mentioning this procedural issue referred to the *Controversia* as a case against “the ecological impacts, the effects on flora and fauna, the effects on the water supply for the town” (interview, 7/20/14) A close reading of the *Controversia* and its resolution shows that both of these arguments are articulated by

Tlapacoyan and taken up by the Supreme Court in different ways.

Tlapacoyan's argument that the MIA procedures have been violated is based on an appeal to the connections within a river basin, specifically that "any project of deforestation or construction on the Rio Jalacingo...geographically affects the hydrological basin which originates there, by the desiccation that it would cause with the supposed ecological flow of ten per cent that would be left in the river channel..." (Controversia 89/2010). Because of this, they claim, it is unconstitutional to approve a project whose effects "go beyond the limits of its location" without notifying downstream users. Semarnat's response argues that "the presumed impact to which [Tlapacoyan] refers is unverified and they do not substantiate it by any means."

The Supreme Court, in resolving this case, notes with some uncertainty that it "suppose[s] the municipality of Tlapacoyan is located downstream from where the water would be returned to the river channel." However, the appeal to the basin is taken up by the court in a moderated fashion: since the basin is covered by the *Ordenamiento*, and since Tlapacoyan has concessions to use water from the same river where the projects would be located (that is, the tunnel), their claim is ruled valid. But instead of adjudicating the question of whether the projects would affect Tlapacoyan's water supply, the ruling is based entirely on violation of MIA procedures. Specifically, the failure to "publish [an excerpt of the MIAs] in a locally circulating daily newspaper"<sup>38</sup> which would have supposedly given Tlapacoyan an opportunity to request a public hearing on the projects.

Between the rejection of Ocampo-Cuetzalin and the ruling against PH1 and PH3, it would now seem that hydropower in the Bobos-Nautla basin had been dealt a significant

---

<sup>38</sup> This practice goes way back - all of the projects in the archive had to follow this same rule. Publish your claim in a local paper three times, ten days apart and if no one objects you're in the clear.

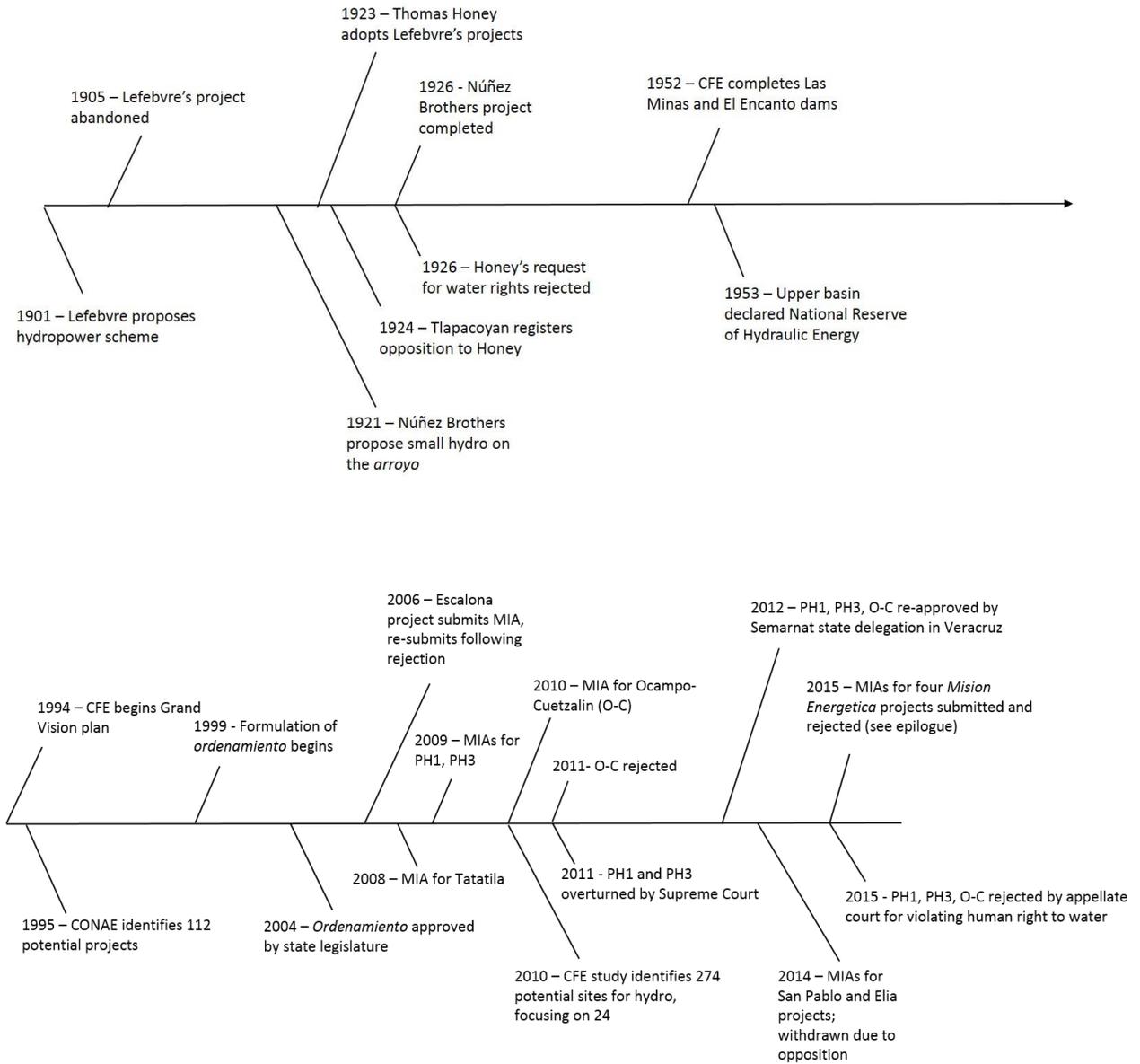
setback. However, in 2012 all of these projects re-submitted their MIAs - with no changes - and received approval. The difference was that this time they were reviewed by the state office of Semarnat in Veracruz, rather than the Mexico City office. According Carlos, “almost every time a MIA is presented at the state level it gets authorized. The defense is poorer, the argumentation - it’s more compromised.” Of the projects with approved MIAs in the basin, only Escalona was reviewed in Mexico City.<sup>39</sup>

One further detail enters into the picture here: in the version submitted to the state office, a prefix is added to the project titles, referring to them as “Land use change in forested areas for construction and operation of mini-hydroelectric plant...” The significance of this was not immediately apparent to me, but Carlos pointed out that this refers to what should be a separate permit, issued by the Forestry Commission (CONAFOR). By appending this title to the MIA, Carlos claims, the companies are attempting to circumvent this additional review. “Who told them to change the name? Someone on the inside is taking them by the hand and guiding them through.” In sum, Carlos said, “when they want to be tough, they’re tough...and when they want to be lax, they are very tolerant. What this means is that they are granting concessions based on political criteria.”

---

<sup>39</sup> The Misión Energética projects in 2015 were rejected at the state level for submitting as “particular” projects. They can re-apply under the “regional” framework. See the epilogue.

Fig. 7. Timeline of hydropower in the Bobos-Nautla basin



## Chapter 6 - Hydropower and the Politics of Nature in the Bobos-Nautla:

### Group Formation in Uneven Terrain

When the projects on the Jalacingo River were first announced in 2009, a counter-movement began to take shape. The *Alianza* has played a central role in challenging and delaying hydropower projects in the basin. In addition to organizing against particular projects, their discourse and political practice seeks to connect this issue to a broader politics of dispossession and exploitation. Their efforts attempt to establish a network that unites actors across the physically and socially uneven space of the basin - from rural communities in the rugged *sierra* where the projects would be sited, to the cities located both on the coastal plain below and the *altiplano* above these mountains. At the same time, this group is “articulated” - a word often used by my informants - with a network of social movements that extends beyond the limits of the basin. As an activist from Xalapa, the state capital of Veracruz, expressed in a speech during a meeting in the sierra of the upper Filobobos, “the rivers and the mountains...do not separate us, they unite us.” However, this unity is far from pre-given and the efforts of the *Alianza* to forge it are beset by numerous tensions. In this section I describe the *Alianza* and its efforts to mobilize opposition to hydropower in the Bobos-Nautla. This account is guided by Latour’s (2005) observation that social groups are not stable entities, but are made of ever-shifting ties whose boundaries are constantly mapped by the actors themselves.

Carlos, introduced at the beginning of the previous chapter, is a central figure in this movement and in my narrative. He founded the *Alianza* with a small group of like-minded friends from Tlapacoyan and communities along the Jalacingo River - especially Epapa and

El Mohón - when they first learned of the proposed projects there. The men and women who make up this group include teachers, engineers, shop owners and local politicians, many of whom have dedicated tremendous time and energy to the movement, often to the detriment of other personal relationships - a source of black humor among the members is the running tally of how many divorces can be attributed to involvement in the *Alianza*.

Although many of the founding members of the group reside in urban Tlapacoyan, a point of frustration frequently voiced in meetings and informal conversations is the lack of “*conciencia*” (conscience) about environmental issues among city dwellers. Benicio, a teacher from El Mohon voiced this concern, saying: “those that live in the center, it’s like they live in another world. They don’t realize where their water comes from and why, they just open the tap...and if you ask them if they are in agreement with the hydropower projects they say yes because it’s progress.”

This anxiety about inadequate *conciencia* also extends to efforts to grow the movement in rural communities. In a meeting in Tlapacoyan, the group discussed whether to circulate a petition requesting a public forum through the MIA process for projects in the upper Filobobos. With the exception of Carlos, they each spoke against this proposal saying that it was “not the right moment” because people do not have *conciencia*. Valeria, who studied sociology in Xalapa, argued that these communities would be too difficult to organize because high rates of out-migration left them with populations composed mainly of women, children and the elderly. All the same, at Carlos’s urging, pushing for these *consultas* remains an important part of the group’s strategy.

The challenge of establishing and sustaining connections with other actors manifests in other ways. Israel, a whitewater rafting guide from Tlapacoyan who frequently participates

in *Alianza* activities told me how disillusioned he was with the other “service providers” (people in the tourism industry, referred to locally as *prestadores de servicio*) in the basin who were reluctant to openly declare their opposition to hydropower projects. Efforts to establish a connection with actors in the lower basin have had mixed results. Visiting Carlos at his home one evening I found him poring through the online public water rights registry ([repda.gob.mx](http://repda.gob.mx)), looking over the names of irrigators in the lower basin that he could recruit to the cause by convincing them their water rights were being threatened. “That’s a new actor,” he pointed out, but they have had little involvement in this conflict. However, a few people based in the lower basin have established a connection with the *Alianza*, spurred by concerns about flooding on the coastal plain. Martin, an accountant and self-taught hydrologist who lives in the city of San Rafael near the coast, has spent the past fifteen years building a “hydrologic model” of the basin that critiques engineering solutions that he says have increased vulnerability to catastrophic floods, and is active in rallying opposition to hydropower in that part of the basin.

Speaking with Rosalinda, an anthropologist and activist who participates in the Xalapa-based group known as LAVIDA (*La Asamblea Veracruzana de Iniciativas de Defensa Ambiental*) about the *Alianza*, she noted that it seemed to her to be a very small group. More than a reflection of the difficulties of gaining support, this was explained to me as a strategic decision - rather than asking people to join the group they encourage the formation of local committees, with the reasoning that this would help minimize accusations that the group is seeking personal or political gain. This echoes a comment Carlos made as we prepared for the meeting in Texcapa. “This is going to be a difficult meeting,” he told me. “The first thing they are going to want to know is who we work for and what political party

we represent.” Anticipating this, Israel opened the meeting with a speech declaring that they “don’t represent any interest other than a concern for the future of our lands” (Fieldnotes 6/11/14).

### Hydropower, Conservation and Property: The River Has No Owner?

One of the central points of contention surrounding hydropower in the Bobos-Nautla is the meaning of environmentalism - who speaks for “nature” and what are the implications of adopting this discourse? If recent literature on hydropower suggests that appeals to sustainability and conservation are being advanced both for and against this technology (Fletcher 2010; see earlier chapter), there have been few studies that examine the micro-politics of nature in this context. Contested definitions of what it means to be an environmentalist and who belongs in that category illuminate the ambiguity surrounding the positions of different actors in this conflict and their relationship to one another. In this section I consider how these competing visions of environment(alism) and its connection to hydropower are navigated by the *Alianza* in their political practice.

Tension surrounding the relationship between protected areas and hydropower is particularly revealing of this ambiguity. “We are not conservationists,” Fernando from LAVIDA told me emphatically when I asked him if he considered himself an environmentalist. “This is a socio-environmental struggle - man acts with nature. [Pushing for protected areas] is the wrong strategy because they do not exclude an extractive model.”

This position, however, is not universally shared within the *Alianza*. When I accompanied a contingent of the *Alianza* to a crowded auditorium in Tlapacoyan where a senator from Veracruz was scheduled to speak, the group adopted a different stance. Pushing their way to the entrance as the senator approached, Carlos and the others caught the

politician’s attention with signs and a steady chant of “*no a las presas*” (no to the dams). But when the senator paused to greet them, Carlos presented a conservation plan for the basin prepared by the environmental NGO ProNatura. Later, Elena told me this was a strategic decision. “He didn’t say we don’t want the dams, he said we want a protected area.”



Fig. 8: Alianza members (holding signs) protest at a campaign rally.

The relationship between the *Alianza* and ProNatura and their sometimes contradictory stances on conservation areas and hydropower speaks to the uncertainty of group boundaries that is not captured in a simple division between hydropower proponents and opponents. Daniel, an ecologist in ProNatura’s regional office outside of Xalapa, made statements when I interviewed him that could easily lead to his being mistaken for an anti-dam activist.

“Obviously [renewable energy] is better than fossil fuels, but the problem is the way the companies and the governments are opening the door to foreign capital and how this capital, in an abusive way, is imposing itself on the communities, even tricking people, saying no, no, this is going to be a small project... The only way for the Mexican *campesino* is not to sell his land. That’s the best environmental defense there

is.”

However, the proposal that this organization developed for a “Declaration of Critical Habitat in the *Sierra de Las Minas*” - the plan that Carlos presented to the senator - links conservation in the basin to hydropower development. Referring to plans for “micro-hydroelectric” plants in the basin, ProNatura says that “although they continue to imply social and environmental risks they are perceived to be more compatible with sustainable development.<sup>40</sup>” These projects are urgently needed, they say, for their supposed potential to alleviate high levels of migration and poverty in the region (ProNatura 2014: 18, 72).

ProNatura has also established a direct partnership with IGR, the Spanish energy company developing projects on the Jalacingo River to restore native cloud forest in the catchment above the hydropower intake. Sitting at his desk, upon which sat a print out of an article titled “The Role of Cloud Affected Forests on Water Inputs to Dams,” Daniel explained this relationship to me: “For them, water is money. I told them that if they want water they need to have a healthy forest. We believe that it’s better to work with these companies. If we just say - as in the traditional environmentalist discourse of Carlos - that this is terrible and we are opposed, then the company will do whatever they want.”

This type of partnership with private companies, he acknowledged, was also partly a response by the organization to shrinking availability of public funds from their traditional partners, such as the U.S. Fish and Wildlife Service. Through this alliance with a respected environmental organization, hydropower companies acquire an important tool for framing their activities as sustainable. Not only do they generate clean energy, goes the story, they

---

<sup>40</sup> This assertion is made with reference to Harrison (2007), who argues that “responsibility for basin wide planning cannot lie with developers of individual projects, but must be led by governments”

also support biodiversity and community development.

In this scenario, occupying a position that both endorses “protecting nature” and rejects conservationism is challenging for Carlos and the *Alianza*. This tension was in evidence in an interaction between Carlos and a community member in Texcapa during that first meeting. In his speech, Carlos both mocked the environmentalist claims of hydropower companies - “they are going to say that it’s nothing, that it’s going to be an ecological park” - and underscored the importance of establishing protected areas and preventing deforestation in the upper basin. When the meeting was opened up for comments, a man from the nearby community of Chachalacas questioned this idea. Having seen a report on television about communities being displaced by a protected area in *Montes Azules*, Chiapas, he was not convinced that this strategy would be beneficial for his community.

Despite being labeled a “traditional environmentalist” by Daniel, when I asked Carlos about the apparent contradictions in his stance on protected areas, a different picture began to emerge. The logic behind his pro-protected area arguments, he told me, is not strictly about conservation but is about changing property rights. Having witnessed several decades of reforms geared towards dismantling public ownership of resources - especially reforms to article 27 of the constitution in 1992 - protected natural areas seemed to him an appealing option to “change the concept of property back to what it was 70 years ago...to socialize natural resources.”

Such challenges to privatization and changes in property rights are inseparable from the conception of environmentalism advanced by Carlos and the *Alianza*, encapsulated by the frequently heard refrain, “the river has no owner.” As the exchange between Carlos and the man from Chachalacas suggests, this strategy embodies a certain contradiction. That is,

nominal state ownership of resources does not preclude the use of juridical and administrative power to transfer rights to private interests in the name of development. As we saw in chapter 4, the federalization of water control, vesting authority in the nation, played an important role in early development of large scale hydraulic infrastructure. The relevance of this pattern, and of the legacy of defining rivers as a “federal zone,” is well captured in a comment made by Daniel. “In the end, [hydropower companies] have the permits because water is a federal resource, it doesn’t belong specifically to the communities, and if there’s a permit they are going to do it.”

Over the course of my interactions with the *Alianza*, Carlos’s way of speaking about property in community meetings underwent a slight but telling shift. During the first meeting in Texcapa, he posed a question to the audience. “I was taught that the mountains, electric energy, petroleum, what is underneath [the soil] belongs - to whom?” A voice from the audience chimed in, “to the people!” Affirming this sentiment but modifying the formulation, Carlos replied with, “to the nation!”

In another meeting some six weeks later, this rhetoric shifted. Here, he told the audience about a comment made by an old man in a previous meeting in Chachalacas. “He said, the government can’t make available [disponer] what doesn’t belong to it... We cannot let the government, nor a person, take the mountains and the rivers, the water... because we are included, we are part of that life.”

Rather than calling for a return to state ownership of resources, then, this modified version proposes an alternative vision that turns Daniel’s formulation on its head: water and rivers belong to communities, not the federal government and, in Carlos’s words, “we each need to make the decisions in the sections of the river where we are.”

This evolving discourse on property can be seen as part of a broader effort on the part of members of the *Alianza* to articulate a vision of environmental politics that is simultaneously “socio-environmental” and “traditional.” Carlos, in a meeting with organizers from rural communities in Hueytamalco encouraged them to “feel affected,” and not to approach problems “like middle class environmentalists from the city who think they can solve problems with money.”

In addition to this exhortation, activists draw on the concept of “territory” to contest the politics of resource control more broadly. This concept is managed fluently by urban activists and intellectuals within the *Alianza*’s broader network. Monica from MAPDER commented on how fashionable this concept had recently become among left-leaning academics in Mexico, and it seems to roll off the tongues of activists such as Fernando who referenced “the struggle for territory on all sides, above, below and in inside the heart.” Territory is also invoked, though less assuredly, by members of the *Alianza* in the basin, as when Elena spoke in a meeting about a man who “defended his...how do you say it? His territory! Because we are not just defending water - the whole territory.”

### Forming a Movement, Performing the Basin

A two-day trip through the *sierra* of the upper Filobobos helped me further understand the strategies of the *Alianza* in their attempt to build a movement that connects different interests and actors both within and beyond the river basin. In my account of this journey, I seek to illuminate some of the tensions within the rural communities who would be most directly affected by hydropower development and the ambiguity of reactions to the projects.

In addition to Carlos and another member of the group from Tlapacoyan, the trip was

made by: several members of LAVIDA; a representative of MAPDER; four men who have been involved successful anti-dam campaigns in the region; a woman from Zapotitlan, just down-river from our destination who decided to join after attending a meeting there; a representative of a local chapter of the *Coordinador Plan Nacional de Ayala*, a *campesino* rights group that has included “defense of natural resources” in its agenda since 1983 (Madrigal 2010: 409); and - despite the concern over appearing “political” - an organizer from the *Partido del Trabajo* (Labor Party) from Tlapacoyan. Three of the men who came to share their successful organizing experience were whitewater rafting guides from Jalcomulco, a town near Xalapa where widespread protest just a few months earlier had detained a proposed large dam on the Rio Pescados. They generously provided a passenger van normally used for rafting trips to make the long, bumpy trip from Altotonga - a municipal seat in the upper basin - into the mountains.

After several hours on a winding dirt road we were met by a pickup truck carrying a group of men in broad-brimmed hats, blue jeans and plaid shirts amid a deafening hum of cicadas issuing from the surrounding forest. Following greetings and introductions, we continued down the road to the community of Tatempa, where the meeting was to be held on a covered concrete patio attached to the local elementary school. As the meeting commenced, a crowd began to gather. Women and children sat in the back along the exterior wall of the school building, while the men clustered alongside and in front of the members of our party awaiting their turn to speak. Carolina, the MAPDER representative, set up a video camera to record the whole affair. The *agente municipal* - a local elected official meant to coordinate with the municipal government - spoke first, introducing the guests. Then Sergio from CPNA spoke, connecting the plans for hydropower on the Filobobos to other conflicts around the

country and to a broader question of land tenure and dispossession:

“About a month ago we began to hear about the energy reform. They also talked about reforming articles 27, 28 [of the constitution] which are the ones that speak about land tenure...For these kinds of projects...they are going to remove the *campesinos* to give [the land] to the company...Now they’ve changed the name: it’s not expropriation. Now it’s called a temporary occupation. But what does that mean? That if the *campesino* doesn’t want to sell, well, I won’t sell, but we are going to use your land for the dam or for the mine. And when we’re done looting all of that, we will return it, but land that is no longer good for anything.”

Next, Carlos spoke, beginning by explaining that he represents “a movement that began four years ago in the lower basin of the Bobos River.” Continuing, he said, “We are children of the same river.” He followed this statement by invoking a litany of facts about the geography of the basin to justify this claim. These facts positioned him as one who at once wields the technical knowledge necessary to evoke the basin as a coherent whole, as well as the local knowledge that establishes his legitimate presence in and connection to this place:

“This river is born in Las Minas, Tatatila and in Aldama, [on the slopes of the] Cofre de Perote. It goes towards Nautla. It is 100km long and 1200m down to sea level. The basin is 4500 hectares. This Bobos River has five tributaries...Let’s say that the river is my arm...the biggest one is the Bobos-Nautla at the end, but above we have...Las Truchas that will join the Bobos in Zapotitlan...the Alcececa that will join the Pancho

Poza River in Atzalan...and the Jalacingo that ends in Tlapacoyan...and it is one river.”

This performance can be seen as an attempt to enroll the audience in the *Alianza's* cause by reference to an already existing natural boundary that establishes their shared interests and goals. Beyond this, the thrust of his speech concerned the lack of consideration of local communities in decision-making and urging the audience to demand that their voices be heard: “We want to have a forum [una mesa] where every legitimate member of the community can say I agree or I disagree with the dam, because the river corresponds to us. The river does not belong to us. The river has no owner. But it corresponds to us because we are users of the river and of nature.”

Carlos's use of the body to illustrate the geography of the basin was more than merely incidental, as this metaphor was invoked repeatedly throughout this and later meetings. The following speaker, Fernando, a self-described “historical materialist” with LAVIDA, began by asking the audience if they knew what a dam was. After a few men in the audience gave mumbled responses both affirmative and negative, Fernando continued:

“Well, they are going to put a wall in the river - 40, 70, 100m tall...But the dam is an invention of the white man, whose object is to steal water and energy...and do you know the damages that a dam causes? Our body is a river of blood, right? What happens when one of our family members eats too much grease and one of their veins gets blocked? They get pneumonia, or a heart attack and die...The river will no longer circulate from where it's born to where it dies.”

After Fernando's speech, Luciano from Jalcomulco shared his experience of organizing against the proposed dam there. He mentioned the difficulty of gaining support when people are used to receiving gifts for participating in political meetings. "When they say, hey there's going to be *Procampo*, there's going to be support for coffee [production], there will be support for houses, people show up." All the same, he recounted how their group had successfully organized a "permanent *planton*" (protest camp) at the site of the proposed dam which had led to the withdrawal of the company planning to build it. This kind of peaceful resistance, he emphasized, needed also to be complemented by legal strategies.

Next, Rolando, who married into the indigenous Totonac community of Olintla in the state of Puebla, recounted his role in a dam conflict there. "I had gone down a [newly paved] road that goes to Copala, the neighboring village...I said, wow, great. What are they going to do here? I didn't imagine it would be a hydroelectric dam...So I said, well, the road is good." After bulldozers began to appear, however, he started to investigate the nature of the project which turned out to be a large dam planned by the mining giant Grupo Mexico. "It came out that they didn't have any permits, and the authorities were in bed with the company [*estaban acarreando a los empresarios*]. The municipality supported the company too...we indigenous people are all alone...and really it was sad for us...what did we need to do? But we organized just like you." After months of protest and a *planton* at the site, this project too was canceled in October 2013.

At this point, the meeting was opened up for reactions from the assembled community members with Fernando intervening to reformulate the soft-spoken comments into a call to action. "He says he wants to defend the river. What do you think?...Raise your

hands those of you who are ready to defend the river. Raise them! We're going to defend it, yes? And we should organize a committee." While many hands went up, the response from the group was palpably hesitant. Antonio, the *agente municipal* explained his thinking:

"About two months ago some people came to ask for my opinion. They said they were not from the company. They asked, what did I think about the dam? I said, well, sure, if there aren't any damages. But I'm not the whole *pueblo*, they would have to consult with the community. And they asked me what did we want, something for the community...and I said you can do this and fix the road, sure. Well, they convinced me."

This, too, was appropriated by Fernando as part of his case against the projects. "What the company does," he said, "is send professionals dedicated to deceiving society, saying they will come with jobs and that they're going to build a road. Do you know who has the obligation to build the roads? The municipal government...not the company."

The ambivalence of this interaction was echoed in numerous ways throughout this meeting and several that followed as we moved further into the sierra. Rumors and uncertainty about how communities in different parts of the basin were reacting to news of the projects, divisions within communities, the role of municipal authorities and the activities of companies - always referenced in an almost mythical tone as *la empresa* (the company) - circulated in both the formal meetings and informal conversations on the sidelines.

After taking our leave from Tatempa, we traveled further up the basin to El Pimiento where it was rumored that a work camp for one of the hydropower projects would be sited.

Confirming the suspicion of some in our party that people here would be enticed by the income associated with feeding and housing the workers, only a handful of people attended the meeting there, held under the eaves of the *casa del campesino*<sup>41</sup> as a thunderstorm began to form. When Fernando asked people to raise their hands if they were ready to defend the river, the few who had gathered to listen responded with uncomfortable glances at one another.

Contrasting with this scene, when we arrived in Mecacalco for our final meeting of the day, a crowd had already started to form. By my count, close to 200 people packed in to the *casa del campesino* to hear the speeches. When Fernando asked people to raise their hands this time, they shot up without further prodding. Two weeks earlier, a confrontation had taken place between people from this community and “the company.” Carlos had recounted his version of this story to me beforehand, explaining that the company behind the project called “Elia” had organized a meeting and that the *Alianza* had predicted that the community would offer little resistance. Instead, 600 people gathered to interrupt the company’s explanation with complaints that they had already started construction on access roads. Company representatives denied this accusation, saying that the construction was part of a different project - Tatatila - in which they denied any involvement. A man from Mecacalco who recalled this incident portrayed it not as a meeting, but as a confrontation with a “machine” working on the contested road that forced a halt to construction. This was followed, he said, by a meeting with the *presidente municipal* of Altotonga in which the mayor claimed not to have any knowledge of the projects but promised to listen to people’s concerns.

---

<sup>41</sup> A meeting hall for an *ejido*



Fig. 8: Meeting in Mecacalco. Response to the question “who thinks we should defend the river?”

Discussing the meeting in Mecacalco several weeks later with my informants from of the municipality of Altotonga complicated this scene. Their account of Mecacalco’s role in this conflict painted a drastically different picture from the unity that seemed apparent during the meeting. The problem, they told me, is that the election of an *agente municipal* in each rural community leads to division. “The worst part is, they hold a public assembly where everyone gets to see who voted for whom, so everyone is divided and looking to punish people who didn’t support them.” In Mecacalco, they went on to say, local *caciques* - landed elites - had likely already been paid off by the hydropower developers and could use the threat of withdrawing distribution of food welfare, or violence, to keep opposition from growing.

This account speaks to a broader theme of the politics of hydropower in the Bobos-Nautla. The actions of companies, political authorities, and communities are never transparent and are accounted for by others with reference to “political interests” that may not be directly related to the projects. These explanations are often made with reference to

the difficult to translate concept of *acarrear*, a word that implies being pulled along. Accounts of who is *acarreando* (pulling) and who is *acarreado* (being pulled) vary widely. In Rolando's use of this term, quoted above, it was local politicians propelling the hydropower projects by *acarreando a los empresarios*. More frequently, people I spoke with used this term to refer to "the people" (*la gente*), who are said to be *acarreada* by some other actor or force, by promises or threats, ties of party affiliation or family. One version of this is that offered by my informants in Altotonga, in which people are *acarreada* by local elites. What appeared to be an expression of resistance to the imposition of hydropower projects in the meeting in Mecacalco is then accounted for as a mere reflection of divisive intra-community politics. In another version, repeated by several openly pro-hydro informants, it was "the environmentalists" who were *acarreando a la gente* with exaggerated claims, in pursuit of personal gain. In this account too, the actions of "the people" are said not be their own but are attributed to some other power acting through them.

As this suggests, hydropower projects in the Bobos-Nautla - even in their pre-construction phase - have become deeply intertwined with power struggles within surrounding communities, testing and shifting political allegiances. In the following section, I consider the messy micro-politics surrounding the projects on the Jalacingo River, continuing to unpack the controversial accounts of who or what is acting to transform this landscape.

### No One Knows Who They Work For: Hydropower on the Jalacingo

When I first arrived in Epapa, a community situated on a ridge overlooking the verdant canyon of the Jalacingo, Benicio, a teacher at the local elementary school took me down to the river in his rusty VW bus with a missing door. As we strolled through the

bucolic pasture in the valley bottom, Benicio occasionally kicked aside the tall grass to point out markers that indicated the intended path of the tube that would carry water to one of the project's "machine houses" at the far end of the field. There, a brass post had been driven into the bedrock at the top of a spectacular waterfall with the barely legible marking "CFE 1995." Looking up the valley, a massive landslide scarred the hillside, casting high-tension power lines into sharp relief against the ocher background of freshly exposed soil. Scarcely audible over the river, we could hear trucks and men working on the road-cut that had caused the landslide.

A thin white line made visible in its path across the eroded area, Benicio told me, carried water from a spring farther up the canyon to homes in Epapa. Ever since construction on this road began, he said, the community's water supply had been periodically shut off, sometimes for days at a time. When he went to investigate what was causing the problem, he found the site closed off by a chain-link fence with a "private property" sign and was told by the workers he could not get through. Taking in this landscape, Mario, a man from the nearby town of Hueytamalco who had accompanied us on this visit commented, "It's very sad to be made to feel like a foreigner in your own home."

Later, when I spoke with José, who lives near the upper terminus of this road, he also told me that he had been denied access. "All of my life I've followed that path to reach the river, to go fishing or hunting. Never in my seventy years, until now, have I been told not to walk through there."



Fig. 9: Surveying the scene of the landslide

Is this an impact of hydropower development? For Benicio and those opposed to the projects, there was no other explanation. Others denied there was any connection. The mayor of Jalacingo told me it was merely coincidental, an independent decision on the part of the landowner. “It’s Mr. Ruiz’s private property. He requested a permit from the municipality to build the road, and if he decides not to let people through or to remove the tube for the water system that’s his right.” If there had been a landslide, he went on to say, it was merely uncovering damage that had been caused during a storm in 1999 - that is, it is purely natural.

Near the end of my time in Epapa, I trudged up through the muddy landslide to find a work crew pushing soil around. “You can’t get through,” they told me. “What’s this road for?” I asked. Their response: “who knows?” As I scrambled back down towards the river, something Israel said to me a few weeks earlier jumped to mind. “We have a saying in Mexico,” he said, “no one knows who they work for.” This uncertainty about who is doing what, to what end, and which actions are connected with the hydropower projects continued to resonate during the rest of the time that I spent in and around this community.

In Epapa, Adrián, an IT professional in his thirties, recalled the first public meeting held by “the company” to present the project in 2009. In his recollection, this meeting was

attended by a Mexican “engineer” as well as a group of well-dressed men he believed to be Canadian, who did not speak Spanish.<sup>42</sup> “At first, things looked positive. They explained that the tubes would be underground, that there wouldn’t be impacts, that it was a small project. They told us they came with the mission of bringing benefits to communities.” Company representatives showed a cartoon video in this meeting, Benicio said, that explained the many benefits that the project would have.

Even though this was their first encounter, Adrián told me, the company had already been doing studies and leaving markers along the river, like the ones Benicio pointed out. They had also already made arrangements with landowners, buying up the areas where the tubes, tunnels and access roads would be sited. In this rugged terrain, highly valued flat, fertile land along the narrow valley floor is concentrated in the hands of a few *terratenientes*, most of whom reside outside of the community - like Mr. Ruiz, who owns the site of the landslide - and apparently had no reservations about selling to the hydropower company. Emiliano, a rancher who lives in a modest home along the river, recalled how pleased he had been to sell a 14-meter-wide right-of-way to the company, freeing himself of debt in the process.

After this first meeting with the company, Adrián said, people began to question their claims. For several years, many in the community organized against the projects, and leaders of this opposition connected with Carlos and others in Tlapacoyan to form the *Alianza*. At one point they even blocked a company truck from accessing the river, and on another occasion they shut down the highway that runs through the middle of the community.

---

<sup>42</sup> So much messiness about where this company is from. Vicente said they are Mexican, and the head of CEMDA is allegedly friendly with their CEO. Later, Carlos said that Vicente told him they are Spanish. As far as I can tell, that’s right - Grupo Impulsa is a Spanish renewable energy company. What is their connection to these mysterious Canadians?

However, this resistance would not last. Benicio recounted how this shift took place:

“People were with us, against the hydropower projects. Even three times we collected signatures...and everyone signed against the projects. But now with the change in [municipal] president...they rejected the signatures. The president, with the company, came to offer people houses, to pave the road to the river, payment of 250 thousand pesos per year, jobs...Now there are only about 60 of us who are against the projects.”

The new municipal president, while he does openly support the projects, denied that he played any role in decision-making, insisting that the municipality “only receives instructions from the federal government.” In a certain sense, Benicio agreed with this assessment, saying that if a local authority opposed a project, politicians from the PRI would cut off financial support for the local government. Still, the conflict between the mayor of Jalacingo and the activists from Epapa has become intensely personal. Elena and Benicio - members of the *Alianza* and the two most vocal critics of the project in this community - told me that the mayor had both threatened to bring a *demanda* (lawsuit) against them, and offered bribes to cease opposition.

All of this contributes to an environment of suspicion and secrecy. Elena would frequently speculate about who was a “traitor” or who had “signed with the company.” Epapa, as well as other communities that would be affected by the proposed projects, had recently formed a committee - at the urging of the mayor - to receive and manage the alleged payments of 250,000 pesos per year that the company would be making. When I talked to the

president of this committee in Epapa, he acknowledged that the group existed but would say no more about how it was intended to function or allocate the money. Further, he suggested that instead of sticking my nose in his business, if I wanted to learn something about the hydropower projects, I ought to follow the “senators and *diputados*” in the capital who make the real decisions.

This arrangement between companies and communities certainly resembles the “hybrids” that scholars of environmental governance speak of (Lemos and Agrawal 2006), though whether this is an instance of genuine corporate responsibility or political coercion - that depends on who you ask. Tension over the project strains relationships in a community where nearly everyone is related to one another through ties of blood and kinship. As Adrián said, “it’s hard to have a fight with your family members...with people you are going to have to greet every day of your life...[some say] these people are traitors, but I think if someone changed their mind it’s a very personal decision.”

### Flow Politics: Divergent Water Narratives

A striking contrast emerged in many of my conversations and interviews about hydropower projects in the Bobos-Nautla. On the one hand, those who were in favor of development would cite the abundance of water in the basin, the fact that hydropower is “non-consumptive” (as it is officially considered by Conagua), and generally insist that these projects would not affect the river’s flow in any way - other than, as several people mentioned, to “improve water quality” through aeration. To take one example, the engineer who manages the CFE projects in the basin told me that small hydro is “a very noble technology, with no capacity to affect the environment.” On the other hand, those opposed to

the projects painted a picture of impending desiccation of rivers and wholesale ecological destruction.

While these divergent narratives might be explained by the political interests of those involved, they also reflect the meanings encoded in water by different actors (cf. Strang 2004). The ways in which these narratives are intertwined with particular ways of making water known and defining water, I argue, are key to understanding the politics of small hydro and its intersection with the waterscape of this region. In this section I move between these different frames of references (cf. Latour 2005: 12) to trace the connections at work in re-shaping the hydrosocial cycle of the Bobos-Nautla basin.

#### *Caudal Ecologico: Defining Minimum Flows, Constructing Abundance*

One of the key points of contention was alluded to in the Supreme Court case mentioned in the previous chapter between Tlapacoyan and the projects on the Jalacingo: “the supposed ecological flow of 10% that they would leave in the river.” Since the design of most small hydro projects - including those in the Bobos-Nautla - involves diverting a portion of the river’s flow into some combination of tunnels, canals and tubes, rather than creating a large reservoir, this raises a different set of issues about water use. How much of the river’s flow will be diverted for hydropower, and how does this affect other water users - including ecosystems - between the intake and outflow of a project?

The idea of requiring a minimum *caudal ecologico* (ecological flow) has been around in Mexico since the 1970s. A technique known as the “Montana Method” for determining the relationship between flow reduction and ecosystem function developed in the U.S. (Tennant 1976), was adopted in Mexico during this era. According to the Montana Method,

maintaining a minimum of 10% of a river's monthly flow is sufficient to maintain a "poor" state of ecosystem health - an indicator that has been used as a guideline for in-stream flows by water administrators since then (Sergio Salinas pers. Comm.). A methodology for determining minimum flows that accounts for both the hydrologic characteristics of specific rivers and the needs of aquatic life was established in 2012 as a type of non-binding regulation known as a *Norma Mexicana*. An official at Conagua that I spoke with dismissed the possibility of implementing this in practice. "You would have to do a study of some little bug, or a plant, or who knows what else. Can you imagine? Besides, in steep river canyons [where small hydro projects are planned] there is not much aquatic life anyway" (Interview 7/23/14)

The need to maintain a *caudal ecológico* is challenged by hydropower companies who use the existence of multiple methods for determining the minimum flow to argue that there is no scientific consensus on how such a volume should be determined. One project takes this a step further, arguing that, "We should keep in mind that if using water for generating electricity in a mini-central should be consistent with the demands of aquatic life...the ecological flow should also allow for the viability of investment...because for every liter per second left for environmental flow, small hydro plants reduce their production of renewable energy...and the profit margin of their investment." (Proyecto Ocampo 2012: 77). Water here is understood as fuel (cf. Bauer 2009), an input to production that is alienated from the social and ecological context in which it is embedded - a commodity whose value is tied solely to that of the electricity it is capable of generating.

Despite these dismissals of the validity of prioritizing environmental flows over hydropower production, MIAs typically present a series of hydrological calculations to

demonstrate that their project would comply with the 10% indicator. Scrutinizing these calculations shows that a number of misleading techniques are used. In some cases, the only direct measurements of the river's flow are from a station that ceased to operate in 1969. In other instances, annual water use for hydropower is compared to annual river flow, failing to mention seasonal variability and the possibility that dry season flows may be lower than the amount needed to operate a plant - meaning that the entirety of the flow may be diverted for hydropower. Some MIAs even claim that their project will divert a uniform 90% of the river's flow with no explanation of how this would be possible during high flows.<sup>43</sup> As much as the particular shortcomings of the science used in these studies, the key point here is that rivers are understood exclusively through quantifiable measurements of flow. This lends their dubious claims a veneer of technical validity. My informant at Conagua assured me that in order to secure their investment, hydropower companies would surely conduct rigorous hydrologic studies. Those opposed to the projects, on the other hand, have "no technical foundation" (Interview 6/x/14).

The apparent abundance of water produced by the calculations of hydropower companies relies on several forms of simplification. First, spatial variation of water flows is collapsed into a single indicator at the basin scale. Likewise, temporal variability is smoothed over by reference to annual flow volumes. In contrast, local ways of knowing and speaking about water emphasize these fine-grained variations, the ephemeral and precarious nature of flows, and the work required to make water flow to communities.

---

<sup>43</sup> Thanks to Mark from Environmental Law Alliance Worldwide (ELAW) for pointing this out.

## Scarcity, Change and Suffering: Local Water Knowledge

The narrative of desiccation and scarcity advanced by many of my informants in the Bobos-Nautla basin is based on a common sense understanding developed through lifelong observation of the local environment. Adrián, again recalling the first meeting with “the company,” remembered pressuring them to specify how much water they planned to use. “I told them, I bet you are going to use more than half of the flow of the river. The water in the river keeps the water underneath from drying up too. If you take all the water out of the river, everything is going to dry up. We live here and we observe how the *arroyos* rise and fall. Right now there seems to be a lot of water but there are times when the water is very low.”

Others pointed to the increasing variability of river flows corresponding with deforestation in the upper basin. Along with this, several people told me, rivers had become choked with sediment eroding from the formerly forested hillsides. Martin, the self-taught hydrologist from San Rafael, recalled that the lower Nautla was navigable until 1944. Since then, he said, a river that was once seven meters deep has become typically only two meters of water above five meters of accumulated sediment - except during floods which have become more frequent and severe. Evidence of this can be seen at the tunnel that feeds Tlapacoyan’s water system - the one built in 1888 - where instead of feeding the system directly as it once did, the river is now several feet below the intake, forcing the city’s water managers to extend a makeshift canal ever further upstream.

Local hydro-ecological knowledge is also profoundly shaped by a history of autonomous management of community water systems, which in turn plays an important role in how people react to hydropower projects. Rural and peri-urban communities in the upper

basin are organized into “water committees” that are responsible for maintaining domestic water supplies which are drawn from springs (called *manantiales* and *nacimientos*), often distant from the site of consumption. Rural water committees such as these are, according to Davila (2006: 49) one of the few water institutions in Mexico that have maintained a high degree of independence from the hydrocracy.

These systems have been established on the basis of informal arrangements between water committees and landowners of sites with a spring. Further underscoring the perceived scarcity of water, many communities have been unable to find a *nacimiento* whose owner is willing to allow access, while others have had to build systems that stretch for many kilometers, crossing property boundaries, political jurisdictions, and rugged terrain to reach an available spring.

These agreements are always somewhat tenuous. Juan, who maintains the water system for El Mohon recounted a series of conflicts over the ownership of the spring from which they draw their water. The site of the spring was contested in the 1980s between a private owner (*un particular*) and an entity called the *Tierras Comunales de San Juan* - land held by the municipality of San Juan but informally occupied by smallholders. When the dispute was resolved in favor of the private owner, he granted El Mohon permission to install a water intake.<sup>44</sup> But the tube still passes through the *tierras comunales*, which Juan said sooner or later would lead to conflict.

An older man from Hueytamalco, and president of his neighborhood water committee, recalled a time before these systems were built: “there was no water here. They had to go to the river to wash. To drink we would put a leaf under a tree and the water would

---

<sup>44</sup> Typical of the water systems managed by *comites* in this area, it consists of a concrete dam about one meter high and a gravity-fed 6 inch steel tube that runs downhill to the community.

collect there when it rained. There's a little spring near here that fortunately has been abandoned...our grandparents would go there at dawn with their jars [cántaros]. That's how we suffered."

Springs like the one he mentioned still dot the landscape, small pools covered by plastered adobe shrines, adorned with wooden crosses and paintings of flowers, fish, hearts and clay jars. As this image suggests, water holds spiritual significance. But as this man's comments indicate, it is also associated with labor, struggle, and suffering.



Fig. 10: a *nacimiento* (spring) in a rural community near Atzalan, Veracruz.

In addition to the arduous work of carrying water from these small springs, they are seen as impermanent and unstable sources of water. In a meeting with water committees from Hueytamalco and *Alianza* members from Epapa/El Mohon, several people recalled how a spring that had once been a water source in El Mohon had quickly dried up. "That whole area was a bunch of really pretty pools," Elena recalled. "Now they are covered by the school because there's no water." A man from Hueytamalco agreed: "there was a tank there, it dried up. The water dehydrated - it disappeared."

“It’s because there’s not the same vegetation that there was before,” Elena explained. “Clearings (*serenos*) are being converted to cultivated fields (*sembradíos*), and the forest is being cut down.” Desiccation of springs is also seen as being linked to replacing native forests with non-native pines. “Those trees are very dry,” one man commented. “The wood is very hot.”

In order to secure steady water supplies, the *comites* have had to negotiate not only with owners of springs but with different government entities. In Hueytamalco, the water committee members recalled how they had first sent a request for technical support to Puebla in 1975 which received a response five years later: for a cost of 150,000 pesos to the community - no small sum - the state government would support the rest of the construction. Since under the 1992 water law, concessions for domestic water use can only be held by municipal governments, local committees have to work through this channel to receive official recognition of their water rights. Committee members from several communities recounted the protracted and often fruitless struggles with municipal authorities to get these documents in order, meaning that in some cases the rights of committees remain informal.

In Hueytamalco, conflict with the municipal government has been particularly acute. Members of the *comités* that I spoke with there recalled that the local government had caused delays to construction of their water system in the 1980s because the mayor “wasn’t pleased that we would have water.” They also spoke about struggles to “fix the papers” (*arreglar los papeles*) that went on for years but were never resolved because it is “in the power of the [municipal] president.” The fact that water concessions - when they are formally granted - are registered in the name of the municipality fuels fear that the local government will try to take control of administering the system. When I accompanied a group from this committee

on their weekly trip to clean their intake, located in a shady canyon in the mountains above the town, Camilo told me about these concerns but was also dismissive of the municipality - “they don’t even know where our spring is,” he declared.



Fig. 11: Members of the *comite de agua* from peri-urban neighborhoods in Hueytamalco, Puebla clean the intake for their water supply.

While these systems are maintained by self-organized community groups, these institutions are not immune to internal struggles over how to manage water. Committee organizers are sometimes accused of pocketing fees collected for maintenance and improvement, while leaders resent the lack of participation and interest among the broader group. Water is understood as a common good, but tension over the behavior of certain users challenges this understanding. In Epapa, two families have installed water purifiers to bottle and sell water from the community water source. This has led some to suggest that every household should meter its use and pay for the volume consumed rather than the nominal flat fee that is currently charged. The president of the water committee, Adrián told me, is opposed to this idea - not to defend communal management, but because his family owns a coffee mill that is also one of the largest consumers of water in the community.

## Springs, Water Committees, and Hydropower Politics

In what ways do local knowledge of water flows and these practices of communal management intersect with the politics of hydropower projects? One frequently voiced concern is that modifying the river's hydrology through diversions for hydropower will cause the springs that supply water for communities to dry up. Martin elaborated on this issue: "mud is going to accumulate [in the river] with the normal rains...this is going to cover up the veins [*veneros*] where water enters the sub-soil, and these *veneros* are what feeds the *nacimientos* down-river."

The claim that hydropower construction will put community water sources at risk figures prominently in CEMDA's lawsuit which asks the government to revoke permits for the projects on the Jalacingo. The proposed design of these projects would divert flow from the Nixtamalapa - a tributary of the Jalacingo - through a tunnel, to the powerhouse located on the latter river, just upstream from where the *manantial* that supplies water for Epapa is located.

Although this detail of the project design seems clear enough in project documents, it is actually denied by the company. In the MIA for Ocampo-Cuetzalin, the company states that "it's important to clarify that the water taken from the Nixtamalapa River is returned to the same river...in the project there is no transfer from one body of water to another." This claim is contested by Vicente from CEMDA who told me that "the transfer [*trasvase*] is the 'quid' of the issue." In the lawsuit (*amparo*), CEMDA - adopting the voice of "members of the *campesino* class situated in the Bobos-Nautla basin" - argues that the project poses a threat to water flows in springs which "occupy within our social milieu a space referred to as 'gift economies.'" This risk is used as part of an argument that approval of these projects

constitutes a violation of human rights, specifically the right to water which was enshrined in the Mexican constitution in 2013.<sup>45</sup>

When I posed this issue to my informant at Conagua, he was adamant that there is no connection between surface and sub-surface flows. Again, he framed this uncertainty in terms of an appeal to technical knowledge. Challenging both the local knowledge of this connection, claims made by “pseudo-environmentalist groups,” and my basis for asking the question, he responded: “Have you studied this to know whether a dam affects a spring?...It’s very difficult to know...but we don’t need to study it, we can *prove* it by putting dye in the river and seeing if it comes out at a spring. If it doesn’t, there’s no connection.”<sup>46</sup>

In addition to concerns about desiccation of springs, the experience that many *comités* have had of struggling with bureaucratic structures for control of their water systems is closely linked with how hydropower projects are understood. Recalling their conflict with the mayor, the president of the *comité* in Hueytamalco said, “It’s just like right now with the hydroelectric projects.” “They are going to take the water away from us,” insisted another man. One of the few women to attend this meeting later added, “Some people say, ‘you as a *comite* exaggerate,’ but it’s not true.”

The connection between hydropower projects and administrative dispossession of customary water rights figures prominently in the *Alianza*’s efforts to mobilize opposition.

As Carlos elaborated in a meeting:

---

<sup>45</sup> See the final chapter for an update on this case

<sup>46</sup> He asserted that they had done such a test with the specific spring in question, but that there was no documentation of this, nor any need for there to be....p.s. this quote is a composite of notes from two separate interviews with the same informant.

“Let’s say the dam is down here...they have a concession for a quantity of water...they say to the recipient of the concession, I’m going to concede 20 million liters of water every year. Right. They have their private water and they generate energy. The problem, what happens with this, if a community over there makes a well, the businessman shows up, ‘hey, you’re taking my water. That water is for the dam!...Because I have a concession you have to make sure I get however many millions of liters, and my liters of water are composed of all the runoff from the springs that are in the surrounding area.’ This happens. This is new.”

These claims are sometimes tied to a belief that hydropower projects are part of a plot to privatize and dispossess community water sources, which takes many forms. Numerous informants told me that they thought the real interest of the hydropower companies was to profit from water rather than energy. Israel, the rafting guide who participates in the *Alianza* told me, “If they take the water out of the river for the dam, then there won’t be any water in Tlapacoyan. Where will the *municipio* get its water? They will have to buy it from the dam, and instead of paying an annual fee people will have to pay by the cubic meter.”

José, from the *comité de agua* in El Mohon told me that he was convinced that the hydropower companies know there is not enough water in the river to operate the proposed plant - again, challenging the supposed abundance touted by proponents. “Later, they will come stick a tube above our water intake and steal the water, although many people don’t believe it.”

Another variation on this theme was proposed by one of my informants from the

municipal government of Altotonga. The Spanish company behind the projects on the Jalacingo River, he told me, was planning to export the water to Spain where they would use it to generate energy through hydrolysis.<sup>47</sup>

The history of mobilizing communal labor to build and maintain water supplies shapes understanding of hydropower projects in another way. The parallels between community water systems and hydropower projects - building a dam to store water and using the force of gravity to redirect its flow - were not lost on Juan: “This is our land and it should be for us to exploit. We exploit this spring - how? By bringing water to the community for life: to drink, to cook, to bathe, to water our plants. But it’s for us. With these projects, it’s all going to be for someone else...I wish the government had come and said ‘this project is for the community, here are the engineers [*tecnicos*], develop it with them.’”

But water committees have not responded uniformly to hydropower projects. In Epapa, the *comité* became divided over the projects - the president reportedly allied with the company, while other members joined the *Alianza*. On the other hand, the meeting in Hueytamalco, upon which I have been drawing throughout this section, was both an impromptu focus group for my benefit and an organizing meeting to establish cooperation between the *Alianza* and an association of water committees on the Puebla side of the state boundary that runs through this region. In this meeting Camilo spoke of the need to “defend water” throughout the region. Lorenzo, addressing the guests from Epapa recalled a recent meeting attended by “people from the slopes of Chignautla where the nine springs are, people like you who are concerned because they are small groups that are conscious that if

---

<sup>47</sup> Hydropower plants can and do generate hydrogen fuel through hydrolysis. There is no mention of any plans to include this in any of the official documentation of the proposed projects on the Bobos-Nautla, much less to export water.

these mountains are deforested, if the cliffs are dynamited to look for minerals, their potable water will be poisoned.” Springs, and the organizations and institutions that form around them, are thus intimately involved in the micro-politics of hydropower in the Bobos-Nautla. They are sites of both cooperation and conflict within communities.

## Epilogue and Conclusion

As I have been working on this thesis, the projects in the Bobos-Nautla have continued to evolve. In the final months of 2014, the two projects, Elia and San Pablo, which were the subject of the meetings held by the *Alianza* in Tatempa, Mecacalco and other communities that I recounted in the previous chapter, were suddenly withdrawn. Officially, the project's sponsor - their identity still unknown beyond a pair of shell companies - decided to discontinue seeking approval of their MIAs, although news reports framed this as a decision made by Semarnat. Signatures gathered by the *Alianza* and the local committees that formed in the wake of those meetings had already forced Semarnat to schedule a public forum on the projects, though it never took place. These local groups continued to pressure municipal officials and company representatives, and according to Carlos and Vicente this pressure undoubtedly played a major role in the company's (or, perhaps, Semarnat's) decision not to continue with the projects.

As if to underscore the fragmentation of decision-making for private hydropower, the sites vacated by Elia and San Pablo were claimed almost immediately by a company calling itself *Mision Energetica*, who filed MIAs for four projects including one called, ironically, *Armonía* (Harmony). But further surprises were in store with these projects. In their MIAs, instead of deriding the idea of a *caudal ecologico*, as previous projects have done, Misión Energetica refers to the 2012 *Norma* on this issue to propose operational guidelines for maintaining environmental flows. Despite this, all four of these projects were summarily rejected by the state delegation of Semarnat that had previously developed a reputation for rubber-stamping controversial proposals. The reason for this rejection was the company's decision to present each installation as a separate project. In Semarnat's opinion, they should

be evaluated together as a “regional” project, and they may yet re-submit under this framework. Although this appears to be a technicality, the mere hint of moving towards a more holistic evaluation of the impact of multiple projects in a river basin is significant.

Meanwhile, on the Jalacingo River, the case brought by CEMDA against the projects there was initially rejected by a district judge but later upheld by an appellate court (“Suspende Tribunal Colegiado,” 2015). The lower court’s rejection of the case asserted that the impact of the projects had already been settled in the MIA process, but in rejecting this decision the appellate court offered a novel interpretation of the human right to water and the precautionary principle, citing potential impacts on community water sources as a justification for suspending approval of the projects (Vicente, Pers. Comm.). In its decision, the court argues that “water should be treated as a social and cultural good, not as a fundamentally economic one” (Queja Numero 137/2015). In response, IGR has reportedly proposed a minor re-location of the projects to skirt this ruling and move forward (“Pese a Suspension” 2015).

What will be the ultimate fate of the Bobos-Nautla, and what does it mean for the future of environmental governance in Mexico? These recent developments suggest that even as social movements successfully challenge these projects, they are unlikely to go away. A project may change hands, location or technical specifications, but still move forward. With growing interest in renewable energy generation and state actions to make investment in these technologies viable, it appears that the number of projects will only continue to multiply.

For this reason, the local and particular struggles playing out in the Bobos-Nautla have broader ramifications. This river basin is something of a proving ground for the future of

small/private hydropower in Mexico. This is why CEMDA, a national organization, has chosen to get involved in this particular case, because of “the urgency for a judicial precedent that will change the dynamic of how these projects are done” (Interview 8/12/14). That a coherent policy framework for private hydropower is lacking should by now be evident, given the contradictory and shifting positions of different state actors and the secrecy that surrounds these decisions. The strategy adopted by CEMDA to push the human right to water to the foreground appears, at least initially, a promising avenue for challenging projects in the courts. But one lesson that should be taken from this conflict is that taking recourse in the courts is unlikely to resolve anything as long as the institutions in place continue to favor expanding hydropower development and currying the favor of investors.

How, then, can issues like the rights of communities to continue drawing water from a spring - and questions of equity more broadly - be integrated into policy “upstream” of the courts? Some efforts have been made in this direction, even if they have not been widely implemented. For example, a recent collaboration between the CFE and The Nature Conservancy (Barajas et al. 2014) seeks to establish a methodology for “sustainable hydropower” that emphasizes assessing the cumulative impacts of development at the river basin scale. Ricardo, the CFE engineer who led the studies for the Bobos-Nautla and also worked on this project, was blunt in his assessment of the direction that future hydropower planning should take: “we need to start treating communities as our partners instead of as our slaves.” But, ironically, this move comes as the CFE’s relevance continues to wane. No matter how holistic or participatory their process becomes - and they certainly have a long way to go on this front - private companies play by a different set of rules. The CFE deciding

to limit the scope of development in the name of sustainability does little to safeguard against private companies adopting discarded projects.

The proliferation of small hydro raises urgent questions about the cumulative impact of these projects, which have so far been largely overlooked in Mexico, but also creates an opportunity for a new model of hydropower development. That a project disrupts the hydrology of a river and surrounding springs, creates division within communities and generates wealth only for investors - these are not intrinsic characteristics of the technology. Rather, they are the result of institutional arrangements that favor profitability for a few over democratic participation. If state action has been necessary to make investment in small hydro viable - as we saw in chapters 3 and 4 - is it not conceivable that these institutions could be modified to rearrange the way that the costs and benefits are distributed? Even Carlos, a hardened anti-dam activist, admitted in a quieter moment that if these projects were designed in collaboration with and for the benefit of communities he would not stand in the way.

Within international policy circles, attention has recently turned to integrating “benefit sharing” with local communities into hydropower development (e.g. Wang 2012). This may be a promising new direction, but if it merely means financial compensation for damage done, it is hard to imagine that it will lead to desirable outcomes. Could small hydro be implemented in a way that benefits rural communities as much as investors? It may be possible, but it is not likely to be profitable - and that is currently the name of the game.

\*\*\*\*

At several points throughout this thesis I have drawn on the work of Bruno Latour (esp. Latour 2005) to develop my argument. Even where his influence is not explicit, I have taken inspiration in his approach to writing, and tried to heed his advice and warnings about what makes a good account. His approach can be summarized very succinctly - “Just describe the state of affairs at hand” (Latour 2005: 144). That is, he is skeptical of any attempt to offer an explanation based on some pre-conceived framework or set of concepts - to attribute outcomes to “context,” “social factors,” or “power.” Instead, we should stick to description, “the highest and rarest achievement” in the social sciences (ibid: 137). But while this approach freed me up to follow the actors, and even to treat objects like Tlapacoyan’s tunnel (Ch. 5) as actors, description is an endless task. Perhaps, then, some insight is to be gained by revisiting some of the other concepts I have used to frame this account.

The idea of the hydrosocial cycle has been helpful for telling recounting the role that different knowledge formations play in the politics of hydropower development in the Bobos-Nautla. This concept offers a welcome corrective to approaches that de-politicize water management, or deterministically oversimplify the relationship between water control and social organization. But, as this approach has been defined and the literature under its banner continues to grow, it is becoming apparent that following the theoretical propositions of the hydrosocial to their conclusion is an extremely tall order. Since this framework rejects dualism and determinism, hydrosocial analysis is supposed to be simultaneously social, political, economic, cultural, and historical. Programmatic calls along these lines are commonplace, even if the path to achieving such a lofty goal is not clearly mapped. I do not claim to have thoroughly accounted for all of these different aspects, and indeed whether any one work can is doubtful.

What, then, has this study added to the ongoing attempt to develop an understanding of the hydrosocial cycle? In the first instance, the concept served as a guidepost as I sought to uncover the connections between different parts of the struggle over water control in the Bobos-Nautla. I tried to show the links between the history of hydropower development (and resistance to it), and the current wave of conflicts. A century of contested projects and policy reforms has played an important role in privileging certain uses and users of this river. Crucially, this insight was gained by examining the history of electricity policy and regulation, and its connections with water control.

The conceptual toolkit of the hydrosocial approach also helped me frame the account of different water knowledges in chapter six. Following Boelens (2014), the competing narratives of water as an abundant (potential) resource and as a scarce, life-sustaining substance under threat are different “water-truths” that are being mobilized for political ends. There is a clear power asymmetry between the former - backed by the authority of science, the administrative state and trans-national capital - and the latter, sustained by a rag-tag network of rural water users, activists and their allies. However, as the recent developments in the case suggest, the subjugation of the “defense of water” discourse by the expertise of would-be developers is not a foregone conclusion. The contingency of the dominance of the developmental discourse becomes apparent especially when one looks at the ongoing legal battles over these projects.

I want to suggest, then, that that the hydrosocial approach could benefit from a more sustained engagement with energy policy/politics and law. Even if both laws and networks of electric infrastructure have been framed as part of a “hydroelectric assemblage” (Linton and Budds 2014), there is a need for more sustained attention to these parts of this assemblage.

These projects are only incipient here, and more work is needed to articulate what I have called the political ecology of the water-energy nexus. As this framework develops, it stands to benefit from engagement with the role of law as an arena of struggle, and its relationship to other ways of contesting resource access and control (Thompson 1975; Andrews and McCarthy 2013).

The moment in which I entered this research is one of transition, rife with possibilities as well as uncertainty. Because the projects I have been following are not yet concrete my focus has largely been on the politics of planning. This is an important moment to unpack, as relationships between different actors are unsettled, and the alliances and divisions that form now will undoubtedly shape the trajectory of hydropower development - and energy futures writ large - in years to come. The crux of my argument has been that the politics of nature - contested definitions of what it means to protect, degrade or restore the environment - are central to this process. This is inextricably bound up with questions of value and property - who can claim ownership of a river? How are different ways of valuing water privileged or ignored in the politics of hydropower development?

Still, there are many questions surrounding small/private hydropower that will only come into focus as more projects are realized. One of the key points of contention that I traced in the previous chapters had to do with the impact of projects on both material flows of water and on water rights. Activists, drawing on reports of experiences in other places paint a dire picture of impending dispossession and environmental degradation, but the question of how and whether existing flows and ways of capturing them are affected by “small” diversion-type hydropower projects should be further studied. As it stands in Mexico, these impacts are generally overlooked in the planning process. Although I would

underscore that this issue should be considered at the outset, for better or worse as more projects are built there will likely be opportunities to study this question *ex post facto*.

The need for steady flows of water to maintain the ability of a small hydro plant to operate raises a further set of questions about the measures that may be taken to ensure this. A hint of what may be in store is contained in the re-forestation efforts undertaken by IGR and ProNatura (Ch. 6). But what remains uncertain here is whether this initial project is a “green” performance or the beginning of a broader effort to transform the landscape. If this type of partnership is to be scaled up - as, indeed, representatives of ProNatura hinted - this raises a host of issues related to resource tenure and control. The same issues that are in play with the hydropower projects in general - who stands to benefit? How do the ways that resources and landscapes are valued change? - would then extend to the conservation practice with which they are linked. Does a conservation-hydropower alliance provide an opportunity for communities to benefit from projects, or will it become an instance of “green grabbing” (Kelly 2011, Doane 2012)?

A second set of emergent concerns has to do with the relationship between privatization, financialization and the future of hydropower. This too can be linked to questions about flow. For instance, how does the (de)regulation of electricity markets affect the way that plants operate, and how does this impact a river’s flow regime (Kern et al 2012)? Further, how might this look in a scenario where multiple privately owned projects operate in one river basin, each potentially responding to different financial incentives? To answer these questions in the Mexican context is beyond the scope of what I can offer here, but as the implications of the recent energy reforms become clearer, and as more private hydropower comes online, they should be studied further.

In addition to the institutional questions surrounding the shift towards private actors in the hydropower sector, there are fundamental issues surrounding the new political economy of hydropower that are still little understood. Ahlers et al (2015) have recently *suggested* that profit might be derived from speculation alone - but is this really the case? If so, what is the geography of hydropower speculation? Do these practices affect what gets built and where, how rivers flow and who controls them? Further research is needed to uncover the logic of changing patterns of investment in hydropower, and their relationship with national and international policy decisions.

In this thesis I have undertaken an initial attempt at tracing the connections that form around hydropower projects in the early stage of a boom. This has taken us from international policy debates, to esoteric details of Mexican water, energy and environmental law, and to the “local” sites of development where a diverse collection of actors are engaged in a struggle to shape the future of the region’s rivers. These struggles are shaped by changing patterns of investment and globally circulating discourses that re-frame hydropower as clean energy, as well as the convergence of a legacy of centralized administration of water – and the definition of rivers as state property – with recent efforts to court private investment in renewable energy. The Bobos-Nautla basin has become a site of conflict over the future of small/private hydropower not only because of these recent shifts, but as a result of a long history of plans that have constructed these rivers as an untapped resource. Questions about who can make claims to rivers, who is positioned to benefit from harnessing their potential energy, and the kinds of alternative claims that are asserted, are relevant not only in this particular case but in the many sites where hydropower development is currently re-intensifying.

Appendix A: Table of Hydropower Projects in Bobos-Nautla Basin

Name	Tributary	Date of First MIA	Capacity (MW)	Company /Financier	Design Notes	Small producer or self-supply?	Customer for self-supply	Current Status
Escalona	Las Minas	2006	12 (originally 9)	LEAF Clean Energy (USA)	Uses outflow of CFE Las Minas plant	self-supply	Molinos Azteca (grain mill)	Under construction
Ocampo-Cuetzalin	Jalacingo	2009	7.7MW	IGR (Spain)	Interbasin transfer to supplement flow. Actually two projects under one name	self-supply	Metaloides (chemical plant), Ecosistemas de Morelos (water treatment plant), Minera Autlan (mining)	Permit overturned by lower court in 2015 for violating human right to water. New MIA filed May 2015.
PH1	Jalacingo	2009	5.3MW	IGR (Spain)	Adjacent to Ocampo-Cuetzalin and PH3	self-supply	see Ocampo-Cuetzalin	Permit overturned by supreme court in 2011. Approved in 2012. Rejected by lower court in 2015, new MIA filed May, 2015
PH3	Jalacingo	2009	9MW	IGR (Spain)	Adjacent to Ocampo-	self-supply	see Ocampo-Cuetzalin	see PH1.

					Cuetzalin and PH3			
Tatatila	Filobobos	2008	30MW	Tatatila (connections to OHL Industrial and Subterra)	Diversion	small producer	n/a	Unknown
Dos Puentes	Minas and Santa Rita	2011	5MW	LEAF Clean Energy (USA)		small producer	n/a	permits approved
El Aguila	Santa Rita	2012	21MW	unknown	would divert water upstream of Dos Puentes, reducing flow to latter	small producer	n/a	permits approved
Elia	Filobobos	2014	24MW	unknown	Impoundment design - 30m high dam.			Withdrawn by company in Nov. 2014
San Pablo	Filobobos	2014	24MW	unknown				Withdrawn by company in Nov. 2014 (backers unknown, but apparently same as Elia)
Armonia, Virgen Guadalupe, Virgen Maria, La Paz	Filobobos	2014	38MW total	Mision Energetica (origin unknown)				4 projects claimed stretch of river vacated by Elia/San Pablo. MIA's rejected January 2015, can reapply.

## References

- Abbasi, Tasneem, and S.A. Abbasi. 2011. "Small Hydro and the Environmental Implications of Its Extensive Utilization." *Renewable and Sustainable Energy Reviews* 15 (4): 2134–43.
- Aboites, Luis. 1998. *El Agua de La Nación: Una Historia Política de México, (1888-1946)*. 1. ed. México, D.F: Centro de Investigaciones y Estudios Superiores en Antropología Social.
- . 2009. *La Decadencia Del Agua de La Nación: Estudio Sobre Desigualdad Social Y Cambio Político En México (segunda Mitad Del Siglo XX)*. Colegio de México.
- Ahlers, R., J. Budds, D. Joshi, V. Merme, and M. Zwartveen. 2015. "Framing Hydropower as Green Energy: Assessing Drivers, Risks and Tensions in the Eastern Himalayas." *Earth System Dynamics* 6 (1): 195–204.
- Alatout, S. 2009. "Bringing Abundance into Environmental Politics: Constructing a Zionist Network of Water Abundance, Immigration, and Colonization." *Social Studies of Science* 39 (3): 363–94.
- Alemán-Nava, Gibrán S., Victor H. Casiano-Flores, Diana L. Cárdenas-Chávez, Rocío Díaz-Chavez, Nicolae Scarlat, Jürgen Mahlknecht, Jean-Francois Dallemand, and Roberto Parra. 2014. "Renewable Energy Research Progress in Mexico: A Review." *Renewable and Sustainable Energy Reviews* 32 (April): 140–53.
- Andrews, Eleanor, and James McCarthy. 2014. "Scale, Shale, and the State: Political Ecologies and Legal Geographies of Shale Gas Development in Pennsylvania." *Journal of Environmental Studies and Sciences* 4 (1): 7–16.
- Azuela, Antonio, Concepción Contreras, and Manuel Angel Cancino. 2007. "El Ordenamiento Ecológico Del Territorio En México: Génesis Y Perspectivas." *México. Secretaria de Medio Ambiente Y Recursos Naturales*.
- Baghel, Ravi, and Marcus Nüsser. 2010. "Discussing Large Dams in Asia after the World Commission on Dams: Is a Political Ecology Approach the Way Forward?" *Water Alternatives* 3 (2).
- Bakis, R. 2007. "The Current Status and Future Opportunities of Hydroelectricity." *Energy Sources Part B-Economics Planning and Policy* 2 (3): 259–66.
- Bakker, Karen. 1999. "The Politics of Hydropower: Developing the Mekong." *Political Geography* 18 (2): 209–32.

- 2003. *An uncooperative commodity: Privatizing water in England and Wales*. Oxford University Press.
- 2012. “Water: Political, Biopolitical, Material.” *Social Studies of Science* 42 (4): 616–23. doi:10.1177/0306312712441396.
- Bakker, Karen, and Gavin Bridge. 2008. “Regulating Resource Use.” In *The SAGE Handbook of Political Geography*, 219–34. London: SAGE Publications Ltd.
- Banister, Jeffrey. 2014. “Are You Wittfogel or against Him? Geophilosophy, Hydro-Sociality, and the State.” *Geoforum* 57 (2014): 205–14.
- Barkin, David, and Timothy King. 1970. *Regional Economic Development: The River Basin Approach in Mexico*. [publisher?]
- Barnes, J., and S. Alatout. 2012. “Water Worlds: Introduction to the Special Issue of Social Studies of Science.” *Social Studies of Science* 42 (4): 483–88.
- Bauer, Carl J. 2009. “Dams and Markets: Rivers and Electric Power in Chile.” *Nat. Resources J.* 49: 583.
- Bijker, W. 2001. “Sociohistorical Technology Studies.” In: Jasanoff, Sheila, Gerald E. Markle, James C. Peterson, and Trevor Pinch, eds. 2001. *Handbook of Science and Technology Studies*. Pp. 229-256. SAGE Publications.
- 2007. “Dikes and Dams, Thick with Politics.” *Isis* 98 (1): 109–23.
- Boelens, Rutgerd. 2014. “Cultural Politics and the Hydrosocial Cycle: Water, Power and Identity in the Andean Highlands.” *Geoforum* 57 (November): 234–47.
- Bouleau, Gabrielle. 2014. “The Co-Production of Science and Waterscapes: The Case of the Seine and the Rhône Rivers, France.” *Geoforum* 57 (November): 248–57.
- Braun, Bruce and Sarah Whatmore, eds. 2010. *Political Matter: Technoscience, Democracy, and Public Life*. University of Minnesota Press.
- Bridge, Gavin, Stefan Bouzarovski, Michael Bradshaw, and Nick Eyre. 2013. “Geographies of Energy Transition: Space, Place and the Low-Carbon Economy.” *Energy Policy* 53 (February): 331–40.
- Briscoe, John. 1999. “The Financing of Hydropower, Irrigation and Water Supply Infrastructure in Developing Countries.” *International Journal of Water Resources Development* 15 (4): 459–91.
- Brown, F. Lee, and Helen M. Ingram. 1987. *Water and Poverty in the Southwest*. Tucson:

- University of Arizona Press.
- Budds, Jessica. 2009. "Contested H2O: Science, Policy and Politics in Water Resources Management in Chile." *Geoforum* 40 (3): 418–30.
- Bulkeley, Harriet. 2005. "Reconfiguring Environmental Governance: Towards a Politics of Scales and Networks." *Political Geography* 24 (8): 875–902.
- Calvert, K. 2015. "From 'Energy Geography' to 'Energy Geographies': Perspectives on a Fertile Academic Borderland." *Progress in Human Geography*, January, 1-21.
- Calvert, K., and W. Mabee. 2014. "Energy Transition Management as a 'spatial Strategy'? Geographical Implications of the transition towards renewable energy." Working paper...
- Casals, V. 2013. "El ingeniero Miguel Ángel de Quevedo y los inicios de la electrificación en México." In: *Capitalismo e historia de la electrificación, 1890-1930. Capital, técnica y organización del negocio eléctrico en España y México*. Ediciones del Serbal.
- Castree, Noel. 2008. "Neoliberalising Nature: The Logics of Deregulation and Reregulation." *Environment and Planning A* 40 (1): 131–52.
- Churchill, Anthony. 1997(a). "Meeting Hydro's Financing and Development Challenges." —1997(b). "Hydropower: A New Business or an Obsolete Industry." In Dorsey, Anthony H. J., World Bank Group, and International Union for Conservation of Nature and Natural Resources. 1997. *Large Dams: Learning from the Past, Looking at the Future: Workshop Proceedings, Gland, Switzerland, April 11-12, 1997*. Gland, Switzerland: IUCN.
- Comision Federal de Electricidad (CFE). 1996. "Informe de Gran Vision, Cuenca del Rio Nautla, Sinopsis."
- 2012. "Programa de Obras e Inversiones del Sector Electrico (POISE) 2012-2026."
- Comision Nacional de Ahorro de Energia (CONAE). 2000. No title.
- Conca, Ken. 2006. *Governing Water: Contentious Transnational Politics and Global Institution Building*. MIT Press Cambridge, MA.
- Connolly, W. 2010. "Materiality, Experience, and Surveillance." Pp. 63-88. In: *Political Matter: Technoscience, Democracy, and Public Life*. Braun, B. And Whatmore, S. Eds. University of Minnesota Press.
- Diaz-Molina, Libertad and J. Saldan~a. 2013. "El papel del estado y de los ingenieros en el proceso de instauracion de politicas publicas en la industria electrica en Mexico." Pp.

- 151-182. In: Saldaña, Juan José, Ed. 2013. *Conocimiento y acción: relaciones históricas de la ciencia, la tecnología y la sociedad en México*.
- Doane, Molly. 2012. *Stealing Shining Rivers: Agrarian Conflict, Market Logic, and Conservation in a Mexican Forest*. University of Arizona Press.
- Egré, Dominique, and Joseph C. Milewski. 2002. "The Diversity of Hydropower Projects." *Energy Policy* 30 (14): 1225–30.
- Ekers, M., Hart, G., and Kipfer, S., eds. 2013. *Gramsci: Space, Nature, Politics*. Somerset, NJ: John Wiley and Sons.
- Ekers, M. And Adrián Loftus. "Gramsci: Space, Nature, Politics." In: Ekers, M., Hart, G., and Kipfer, S., eds. 2013. *Gramsci: Space, Nature, Politics*. Somerset, NJ: John Wiley and Sons.
- Erlewein, Adriánander. 2014. "The Promotion of Dams Through the Clean Development Mechanism: Between Sustainable Climate Protection and Carbon Colonialism." In *Large Dams in Asia*, 149–68. Springer.
- Erlewein, Adriánander, and Marcus Nüsser. 2011. "Offsetting Greenhouse Gas Emissions in the Himalaya? Clean Development Dams in Himachal Pradesh, India." *Mountain Research and Development* 31 (4): 293–304.
- Escobar, Marisa, Francisco Flores López, and Victoria Clark. 2011. *Energy-Water-Climate Planning for Development Without Carbon in Latin America and the Caribbean*. Somerville, MA: Stockholm Environment Institute-US Center.
- Fearnside, Philip M. 2013. "Carbon Credit for Hydroelectric Dams as a Source of Greenhouse-Gas Emissions: The Example of Brazil's Teles Pires Dam." *Mitigation and Adaptation Strategies for Global Change* 18 (5): 691–99.
- Featherstone, D. 2013. "Gramsci in Action." In: Ekers, M., Hart, G., and Kipfer, S., eds. Pp. 65-82. In: *Gramsci: Space, Nature, Politics*. Somerset, NJ: John Wiley and Sons.
- Fernandez, Sara. 2014. "Much Ado About Minimum Flows...Unpacking Indicators to Reveal Water Politics." *Geoforum* 57 (November): 258–71.
- Finley-Brook, Mary, and Curtis Thomas. 2011. "Renewable Energy and Human Rights Violations: Illustrative Cases from Indigenous Territories in Panama." *Annals of the Association of American Geographers* 101 (4): 863–72.
- Fletcher, Robert. 2011. "When Environmental Issues Collide: Climate Change and the Shifting Political Ecology of Hydroelectric Power." *Peace and Conflict Monitor* 5.

- Fox, Jonathan. 1996. "How Does Civil Society Thicken? The Political Construction of Social Capital in Rural Mexico." *World Development* 24 (6): 1089–1103.
- Franco, Jennifer, Lyla Mehta, and Gert Jan Veldwisch. 2013. "The Global Politics of Water Grabbing." *Third World Quarterly* 34 (9): 1651–75.
- Garcia Ortiz, Juan, J. Garcia Herrera, O. Calahorra Fuentes, R. Lopez Horacio. 2010. "Identificación del potencial Minihidroeléctrico en la Cuenca del Río Nautla, Ver." XXI Congreso Nacional de Hidráulica, Guadalajara, Jalisco, Mexico, October 2010.
- Gillilan, David M. 1997. *Instream Flow Protection: Seeking a Balance in Western Water Use*. Island Press.
- Goldman, M. 2001. "The Birth of a Discipline: Producing Authoritative Green Knowledge, World Bank-Style." *Ethnography* 2 (2): 191–217.
- Gómez Fuentes, Anahí Copitzky. 2015. "Redes Y Movimientos Sociales En Contra de La Construcción de Presas En México. El Caso Del Movimiento Mexicano de Afectados Por Las Presas Y En Defensa de Los Ríos." *Revista Espaço Acadêmico* 14 (167): 05–15.
- Groves, Christopher, Max Munday, and Natalia Yakovleva. 2013. "Fighting the Pipe: Neoliberal Governance and Barriers to Effective Community Participation in Energy Infrastructure Planning." *Environment and Planning C: Government and Policy* 31 (2): 340–56.
- Harrison, Conor. 2013. "'Accomplished by Methods Which Are Indefensible': Electric Utilities, Finance, and the Natural Barriers to Accumulation." *Geoforum* 49 (October): 173–83.
- Harvey, D. 1996. *Justice, Nature, and the Geography of Difference*. Blackwell.
- Herodote. 2007 [1977]. "Herodote Editorial." In: *Space Knowledge and Power: Foucault and Geography*. Crampton, J. And Elden S., eds. Ashgate Publishing.
- Huacuz, Jorge M. 2005. "The Road to Green Power in Mexico—reflections on the Prospects for the Large-Scale and Sustainable Implementation of Renewable Energy." *Energy Policy* 33 (16): 2087–99.
- "*Hidroeléctrica Privada para Minera Autlan*." 2011. *Elektron: Boletín del Frente de Trabajadores de la Energía de México*. 11(280), October 10, 2011.
- Horowitz, Leah S. 2011. "Interpreting Industry's Impacts: Micropolitical Ecologies of Divergent Community Responses: Interpreting Industry's Impacts." *Development and Change* 42 (6): 1379–91.

- Hutchinson, Nick. 2015. "21st Century Dams." *Geodate* 28 (3): 9–11.
- Islar, Mine. 2012. "Privatised Hydropower Development in Turkey: A Case of Water Grabbing?" *Water Alternatives* 5 (2).
- Jaccard, Mark, Noel Melton, and John Nyboer. 2011. "Institutions and Processes for Scaling up Renewables: Run-of-River Hydropower in British Columbia." *Energy Policy* 39 (7): 4042–50.
- Jiusto, S. 2009. "Energy Transformations and Geographic Research." In: *A Companion to Environmental Geography*. Pp. 533-551. Castree, N., Demeritt, D., Liverman, D. and Rhoads, B., eds. Wiley-Blackwell.
- Johnson, Todd, C. Alatorre, Z. Romo, and F. Liu. 2009. "Low-Carbon Development for Mexico." Washington: World Bank Group.
- Kaika, Maria. 2006. "Dams as symbols of modernization: the urbanization of nature between geographical imagination and materiality." *Annals of the Association of American Geographers* 96 (2): 276-301.
- Käkönen, Mira, and Philip Hirsch. 2013. "The Anti-Politics of Mekong Knowledge Production." *Contested Waterscapes in the Mekong Region: Hydropower, Livelihoods and Governance*, 333–65.
- Kelly, Alice B. 2011. "Conservation Practice as Primitive Accumulation." *Journal of Peasant Studies* 38 (4): 683–701.
- Kern, Jordan D., Gregory W. Characklis, Martin W. Doyle, Seth Blumsack, and Richard B. Whisnant. 2012. "Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime." *Journal of Water Resources Planning and Management-Asce* 138 (4): 342–55.
- Khagram, Sanjeev. 2004. *Dams and Development: Transnational Struggles for Water and Power*. Cornell University Press.
- Krause, Franz. 2014. "Making a Reservoir: Heterogeneous Engineering on the Kemi River in Finnish Lapland." *Geoforum*, October.
- Kumar, Arun, T. Schei, A. Ahenkorah, R. Caceres Rodriguez, J. Devernay, M. Freitas, D. Hall, A. Killingveit and Z. Liu. 2011. Hydropower. In IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation [O. Edenhofer, R. Pichs-Madruga, Y. Sokona, K. Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlomer, C. von Stechow (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Latour, Bruno. 2004. *Politics of Nature*. Harvard University Press.

- 2005. *Reassembling the Social-an Introduction to Actor-Network-Theory*. Oxford University Press.
- 2008. *What Is the Style of Matters of Concern?* Amsterdam: Van Gorcum,
- Lazzaro, G., S. Basso, M. Schirmer, and G. Botter. 2013. “Water Management Strategies for Run-of-River Power Plants: Profitability and Hydrologic Impact between the Intake and the Outflow.” *Water Resources Research* 49 (12): 8285–98.
- Lefebvre, Henri. 1991. *The production of space*. Oxford: Blackwell.
- Lemos, Maria Carmen, and Arun Agrawal. 2006. “Environmental Governance.” *Annual Review of Environment and Resources* 31 (1): 297–325.
- Linton, Jamie. 2010. *What is water?: The history of a modern abstraction*. UBC Press.
- Linton, Jamie, and Jessica Budds. 2014. “The Hydrosocial Cycle: Defining and Mobilizing a Relational-Dialectical Approach to Water.” *Geoforum* 57 (November): 170–80.
- Lopez Mateos, Adolfo. 1960. “La Nacionalizacion de la Industria Electrica.” Mexico City: Editorial La Justicia.
- Luege Tamargo, Jose Luis. “CRITERIO de interpretación de los artículos 80 de la Ley de Aguas Nacionales y 120 de su Reglamento en materia de generación de energía hidroeléctrica en pequeña producción o escala.” *Diario Oficial de la Nacion*, June 16, 2011.
- Madrigal González, David. 2010. “Las movilizaciones ambientales: orígenes y transformaciones históricas.” In: *Los Grandes Problemas de México IV: Medio Ambiente*. José Luis Lezama and Boris Graizbord, eds. Mexico City: Colegio de México
- McCarthy, James, and Scott Prudham. 2004. “Neoliberal Nature and the Nature of Neoliberalism.” *Geoforum* 35 (3): 275–83.
- Meehan, Katie M. 2014. “Tool-Power: Water Infrastructure as Wellsprings of State Power.” *Geoforum* 57 (November): 215–24.
- Mehta, Lyla, Gert Jan Veldwisch, and Jennifer Franco. 2012. “Introduction to the Special Issue: Water Grabbing? Focus on the (Re) Appropriation of Finite Water Resources.” *Water Alternatives* 5 (2).
- Meier, Peter. E Zolezzi, S. Bogach, T. Muir, and K. Bazek. 2011 *Peru Opportunities and Challenges of Small Hydropower Development*. Energy Sector Management Assistance Program (ESMAP) Formal Report 340/11. Washington: World Bank Group.

- Merme, Vincent, Rhodante Ahlers, and Joyeeta Gupta. 2014. "Private Equity, Public Affair: Hydropower Financing in the Mekong Basin." *Global Environmental Change* 24 (January): 20–29.
- Molle, François, Peter P. Mollinga, and Philippus Wester. 2009. "Hydraulic Bureaucracies and the Hydraulic Mission: Flows of Water, Flows of Power." *Water Alternatives* 2 (3).
- Mollinga, Peter P. 2014. "Canal Irrigation and the Hydrosocial Cycle." *Geoforum* 57 (November): 192–204.
- Moore, Deborah, John Dore, and Dipak Gyawali. 2010. "The World Commission on Dams+ 10: Revisiting the Large Dam Controversy." *Water Alternatives* 3 (2).
- Murray Li, Tania. 2000. "Articulating Indigenous Identity in Indonesia: Resource Politics and the Tribal Slot." *Comparative Studies in Society and History* 42 (01): 149–79.
- Mussetta, Paula. 2009. "Participación Y Gobernanza. El Modelo de Gobierno Del Agua En México." *Espacios Públicos, UNAM* 25 (12): 66–84.
- Newell, Peter, Philipp Pattberg, and Heike Schroeder. 2012. "Multiactor Governance and the Environment." *Annual Review of Environment and Resources* 37 (1): 365–87.
- Olvera Molina, Monica. "Privatizaciones Transversales a la Construcción de Grandes Presas Hidroeléctricas Durante el Neoliberalismo en México." Pp. 252-273. In: Sandoval Palacios, Juan Manuel, Raquel Álvarez de Flores, Sara Yaneth Fernández Moreno, eds. *Planes geoestratégicos, desplazamientos y migraciones forzadas en el área del Proyecto de Desarrollo e Integración de Mesoamérica*. Mexico: Seminario Permanente de Estudios Chicanos y de Fronteras SPECH. Departamento de Etnología y Antropología Social DEAS Instituto Nacional de Antropología e Historia INAH, México.
- Orlove, Ben, and Steven C. Caton. 2010. "Water Sustainability: Anthropological Approaches and Prospects." *Annual Review of Anthropology* 39 (1): 401–15.
- Paavola, Jouni. 2007. "Institutions and Environmental Governance: A Reconceptualization." *Ecological Economics* 63 (1): 93–103.
- Paish, Oliver. 2002. "Small Hydro Power: Technology and Current Status." *Renewable and Sustainable Energy Reviews* 6 (6): 537–56.
- Panico, Francesco. 2014. "Poder Y Territorio En México: El Proyecto Hidroeléctrico Zongolica, Veracruz." *Iberoamerica* 16(1): 209-235.
- Parker, Dallas, J. Valera, P. Ferrante, G. Salinas and J. Furlow. 2014. "Analysis of Mexico's

- New Electric Industry Law.” Mayer Brown Legal Update, August 14, 2014.
- Parra, Alma L. 1988. *Los Orígenes de La Industria Eléctrica En México: Las Compañías Británicas de Electricidad*. Historias. Mexico City: Instituto Nacional de Antropología e Historia.
- Perreault, Tom. 2014. “What Kind of Governance for What Kind of Equity? Towards a Theorization of Justice in Water Governance.” *Water International* 39 (2): 233–45.
- Perreault, Tom and Gavin Bridge. 2009. “Environmental Governance.” In: *A Companion to Environmental Geography*. Pp. 442-460. Castree, N., Demeritt, D., Liverman, D. and Rhoads, B., eds. Wiley-Blackwell.
- “Pese a Suspensión, se construirán presas al margen del Río Bobos.” 2015. La Jornada Veracruz, May 29, 2015. <http://www.jornadaveracruz.com.mx/pese-a-suspension-se-construiran-presas-al-margen-del-bobos-ante-cambio-de-sitio/>. Accessed June 9, 2015.
- Pritchard, Sara B. 2011. *Confluence*. Harvard University Press.
- ProNatura Veracruz, A.C. 2014. “Propuesta para decretar como hábitat crítico el bosque mesófilo de montaña de la Sierra de las Minas, Veracruz.”
- Ramos-Gutiérrez, Leonardo, and Manuel Montenegro-Fragoso. 2012. “Las Centrales Hidroeléctricas En México: Pasado, Presente Y Futuro.” *Tecnología Y Ciencias Del Agua* 3 (2): 103–21.
- Reed, M. G., and S. Bruyneel. 2010. “Rescaling Environmental Governance, Rethinking the State: A Three-Dimensional Review.” *Progress in Human Geography* 34 (5): 646–53.
- Reisner, Marc. 1986. “Cadillac Desert: The American West and Its Disappearing Water.” [publisher?]
- Rex, William, Vivien Foster, Kimberly Lyon, Julia Bucknall and Rikard Liden. 2014. “Supporting Hydropower: An Overview of the World Bank Group’s Engagement.” LiveWire 2014/36. World Bank Group.
- Richardson, Tanya, and Gisa Weszkalnys. 2014. “Introduction: Resource Materialities.” *Anthropological Quarterly* 87(1): 5-30.
- Robinson, Niklas. 2009. “The Decade of the Grijalva: Bureaucratic Change and the Streamlined Politics of Water Management in Southeastern Mexico.” *El Norte: The Finnish Journal of Latin American Studies*.
- Robinson, Scott. 2000. “The Experience with Dams and Resettlement in Mexico.”

- Contributing Paper to Displacement, Resettlement, Rehabilitation, Reparation and Development. World Commission on Dams Thematic Review Social*, no. 1.3.
- Rowland, Nicholas and Jan-Hendrik Passoth. 2015. "Infrastructure and the State in Science and Technology Studies." *Social Studies of Science*, 45(1), 137-145.
- Sabás Vargas, Misael. 2012. 'Ellos No Son Los Dueños, No Hicieron La Tierra Y El Agua, No Lucharon': Movimiento Social En Contra de La Hidroeléctrica La Parota. *Nueva Antropología* 25 (77): 201–28.
- Schell Jr., William . 1999. *Integral Outsiders: The American Colony in Mexico Cit*.  
Wilmington: Rowman & Littlefield Publishers.
- Scott, James C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. Yale University Press.
- 2006. "High Modernist Social Engineering: The Case of the Tennessee Valley Authority." *Experiencing the State. Oxford University Press, New Delhi*, 3–52.
- Shaw, Karena. 2011. "Climate Deadlocks: The Environmental Politics of Energy Systems." *Environmental Politics* 20 (5): 743–63.
- Skinner, Jamie and L. Hass. 2014. "Briefing: renewed hydropower investment needs social and environmental safeguards." London: International Institute of Environment and Development.
- Sneddon, C. 2012. "The 'Sinew of Development': Cold War Geopolitics, Technical Expertise, and Water Resource Development in Southeast Asia, 1954-1975." *Social Studies of Science* 42 (4): 564–90.
- Strang, Veronica. 2004. *The Meaning of Water*. Oxford: Berg Publishers.
- "Suspende Tribunal Colegiado construccion de hidroelectricas en Veracruz." April 23, 2015. <http://www.radioformula.com.mx/notas.asp?Idn=496759&idFC=2015>. Accessed June 9, 2015.
- Swyngedouw, Erik. 2009. "The Political Economy and Political Ecology of the Hydro-Social Cycle." *Journal of Contemporary Water Research & Education*, 142 (1): 56–60.
- Tennant, Donald Leroy. 1976. "Instream Flow Regimens for Fish, Wildlife, Recreation and Related Environmental Resources." *Fisheries* 1 (4): 6–10.
- Tickell, Adam, and Jamie A. Peck. 1995. "Social regulation after Fordism: regulation theory, neo-liberalism and the global-local nexus." *Economy and Society* 24 (3): 357-386.

- Thompson, Edward Palmer. 1975. *Whigs and Hunters: The Origin of the Black Act*. Allen Lane London.
- Tortajada, Cecilia, Dogan Altinbilek, and Asit K. Biswas. 2012. *Impacts of Large Dams: A Global Assessment*. Springer.
- Tortajada, Cecilia, and Nancy Contreras-Moreno. 2007. "Institutions for River Basin Development in Mexico, 1947–1986." *Water International* 32 (1): 91–104.
- Wang, Chaogang. 2012. "A Guide for Local Benefit Sharing in Hydropower Projects." <http://agris.fao.org/agris-search/search.do?recordID=US2014604138>.
- Winner, L. 1980. Do artifacts have politics? *Daedalus* 109(1): 121–136.
- Vayda, Andrew P. 1983. "Progressive Contextualization: Methods for Research in Human Ecology." *Human Ecology* 11 (3): 265–81.
- Velázquez García, Mario Alberto. 2010. "Los movimientos ambientales en México" In *Los Grandes Problemas de México VI: Movimeintos Sociales*. Ilán Bizberg and Francisco Zapata, eds. Mexico City: Colegio de México.
- Wester, Philippus, Edwin Rap, and Sergio Vargas-Velázquez. 2009. "The Hydraulic Mission and the Mexican Hydrocracy: Regulating and Reforming the Flows of Water and Power." *Water Alternatives* 2 (3).
- Wilder, Margaret, and Patricia Romero Lankao. 2006. "Paradoxes of Decentralization: Water Reform and Social Implications in Mexico." *World Development* 34 (11): 1977–95.
- Whiteford, Scott, and Roberto Melville, eds. 2002. *Protecting a Sacred Gift: Water and Social Change in Mexico*. La Jolla, Calif: Center for U.S.-Mexican Studies, University of California.
- Wittfogel, Karl August. 1957. *Oriental despotism: A study of total power*. Yale University Press.
- Yates, J. S., and K. Bakker. 2014. "Debating the 'Post-Neoliberal Turn' in Latin America." *Progress in Human Geography* 38 (1): 62–90.