Universitat Autònoma de Barcelona

Hydropower and Ecological Conflicts. From resistance to transformations

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PhD Thesis
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Supervision: Prof. Joan Martínez Alier,
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Tutor: Prof. Louis Lemkow

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To all rivers and waters of the world

that nurture and connect life and memories

नदी का धर्म है कि वह बहती रहे

("The nature of a river is to keep flowing"[1])

River Isonzo-Soča in Tolmin, Slovenia. Foto: Erika Buzin

[1] Citation of Gandhian intellectual and educator Kashinath Trivedi, in Baviskar (1995).

Table of Content

Abstract

Hydropower is undergoing a new construction boom globally and is increasingly promoted as a sustainable and renewable source of energy. Yet construction of hydroelectric dams results in a growing number of ecological conflicts due to both ecological and social impacts. In response, impacted communities and activists are mobilising in social movements and international networks. To date, social research has largely focused on assessing the project-specific impacts of large dams and the associated opposition that has arisen.

This research critiques the recent expansion of hydropower that is being legitimised through a discourse of sustainability, takes a territory-wide perspective and focuses on the transformative forces that arise from within anti-dam social movements. This thesis adopts the lens of political ecology and ecological economics and an activist-led research approach to investigate three main dimensions of anti-dam resistance.

First, this thesis examines the expansion of hydropower along one recent commodity extraction frontier, the Himalayan state of Himachal Pradesh in India. This research was done in collaboration with local activists and independent researchers and through participatory regional mapping of 17 cases of conflict using the Global Atlas of Environmental Justice – EJAtlas. It analyses the actors involved and the valuation languages of the impacted communities who protest and mobilise, including concerns over disruption of local ecologies, violation of laws, and the violent character of hydropower expansion. It finally discusses imposed large-scale renewables as additional drivers of a 'renewables' extractivism' promoted as sustainable green energy

and by a ‘consensus of infrastructures’, parallel to a ‘consensus of commodities’.

Secondly, this thesis adopts a comparative political ecology approach to inquiry trends and patterns of violent repression of the anti-dam protest globally. It analyses 220 cases of ecological conflicts over hydroelectric dams included in the EJAtlas database, focusing on four main categories of the ‘Outcomes’ namely violent repression of protests, criminalization, violent targeting of activists and assassinations, as well as the types of groups mobilizing, the forms of mobilization, and the most frequently reported socio-economic, environmental and health impacts. This section shows how violence particularly increases in Indigenous territories and how repression not only targets the opposition to specific projects but aims at delegitimising other and different relations to the territory, world-visions, and ontologies.
Thirdly, this dissertation discusses how anti-dam movements play a central role in the production of forces for transformation that are born out of the resistance. This section is based on interviews with lead activists and community members and through personal participation in activist networks. It argues that in response to the land, water and energy grabbing (alias, sovereignty grabbing) caused by the hydropower industry, movements increasingly call for resistance to: ‘scale out’ across sectors (land, water and energy) to overcome the sectorialisation of social movements; expand the understanding of impacts, not only referring to ‘project-affected’ but to ‘(energy)model-affected people’, in order to widen the outreach of resistance; engage in an epistemic struggle for the recognition of a pluralistic understanding of land, water and energy. This section finally presents ‘energy sovereignty’ as an emerging slogan of anti-dam resistance and thus of the vocabulary of environmental justice to reclaim people’s control over different energy models and diverse and other ‘territorialities’.

Resumen

El sector hidroeléctrico está pasando por una fase de expansión a nivel global, siendo promovido como una fuente de energía sostenible y renovable. Sin embargo, la construción de represas está causando un creciente número de conflictos ambientales debido a sus impactos, tanto ecológicos como sociales. Al mismo tiempo, activistas y comunidades afectadas se organizan en movimientos sociales y redes internacionales para denunciar impactos y violencia en sus territorios.

Hasta la fecha, la investigación se ha centrado en gran medida en evaluar los impactos específicos de las grandes represas y la oposición asociada que ha surgido. Esta tesis critica la reciente expansión de la energía hidroeléctrica que se está legitimado a través de un discurso de sostenibilidad, toma una perspectiva territorial y se centra en las fuerzas transformadoras que surgen de los movimientos sociales anti-represas. Esta tesis adopta el abordaje de la ecología política y de la economía ecológica, bajo el enfoque de la investigación activista (también denominada investigación militante) para abordar tres dimensiones principales de la resistencia anti-represas.

Primero, esta tesis investiga la expansión del sector hidroeléctrico a lo largo de una reciente frontera extractiva, el estado Himalayano de Himachal Pradesh en la India. Esta investigación se realizó en colaboración con activistas locales e investigadores independientes, a través de un mapeo regional participativo de 17 casos de conflicto, utilizando el EJAtlas, el Atlas Mundial de Justicia Ambiental. Se analizan los actores involucrados y los lenguajes de valoración de las comunidades afectadas que protestan y se movilizan, incluyendo las preocupaciones por los impactos ecológicos, la violación de leyes, y el carácter violento de la expansión del sector

hidroeléctrico. Finalmente, se discuten las energías renovables de gran escala como adicionales impulsoras de un 'extractivismo de las renovables', promovido por el discurso de la energía limpia, y un 'consenso de las infraestructuras', paralelo al 'consenso de los commodities'.

Segundo, esta tesis adopta el abordaje de la ecología política comparativa para investigar las tendencias y patrones de la represión violenta de las protestas anti-represas a nivel mundial. Se analizan 220 casos de conflictos por represas hidroeléctricas incluídos en el EJAtlas, focalizando principalmente en cuatro categorías de 'Outcomes' (represión violenta de la protesta, criminalización, persecución violenta de activistas, y asesinatos); así como también se destacan los grupos movilizados, sus formas de movilización, y los impactos socio-económicos, ambientales y de salud más frecuentemente reportados. Esta sección muestra cómo la violencia aumenta de forma específica en territorios indígenas, y cómo la represión no solamente se dirige a la oposición a determinados proyectos, sino que también se busca deslegitimar otras formas de relacionarse con el territorio, otras visiones del mundo, y otras ontologías.

Tercero, esta tesis discute cómo los movimientos anti-represas juegan un rol importante en la generación de fuerzas transformadoras que nacen desde la resistencia. Esta sección se basa en entrevistas a líderes activistas y a miembros de comunidades, y en la participación personal en redes de activistas. Se argumenta que, en respuesta a procesos de acaparamiento de tierra, agua y energía (es decir, de soberanía) por parte de la industria hidroeléctrica, los movimientos apelan de manera creciente a: trabajar transversalmente los temas (tierra, agua, energía) para superar la sectorializacion de los movimientos sociales; ampliar la forma de entender los 'impactos' y pasar del concepto de 'afectado por proyecto' a 'afectado

por el modelo (energético)', aumentando el alcance de la resistencia; comprometerse en una lucha epistémica por el reconocimiento de formas plurales de comprender la tierra, el agua y la energía. Esta sección finalmente presenta la 'soberanía energética' como un eslogan emergente de la resistencia anti-represas y, por consiguiente, del vocabulario de la justicia ambiental, que reivindica el control popular sobre diferentes modelos energéticos y diversas 'territorialidades'.

Preface

The first time I heard about large-scale displacement due to dams, I was at the European Water Social Forum held in Florence in 2003. I was a high school student and I was preparing my first dissertation on water conflicts and 'environmental justice'. I learnt about this concept and related academic litarature from a friend's master thesis and since then I became more and more interested in environmental resistances. The Florence social forum was for me the first time I engaged with activist international networks. The journey of this thesis starts from there.

After graduation in international relations and social anthropology, I worked in international activism for water justice for several years with the Italian NGO CeVI, with the Forum Italiano dei Movimenti per l'Acqua, and with the European Water Movement, and later also on social justice, migration and environmental education with the Tenda per la Pace e i Diritti. In 2012, I was invited to collaborate with the Associazione per la Decrescita for the organization of the Third International Conference on Degrowth for Ecological Sustainability and Social Equity in Venice.

During the months of preparation of the conference, I was accepted for attending the Summer School in Political Ecology, Environmental Justice and Conflicts at ICTA (taught by Joan Martínez-Alier, Isabelle Anguelovski, Marco Armiero, Stefania Barca, Robert Bullard, Giorgos Kallis, David Szablowski, Jesus Ramos Martin, among others). This was my first visit to ICTA.

Few months later I joined the EJOLT – Environmental Justice Organisations, Liabilities and Trade project (2011-2015), coordinated by Joan Martínez-

Alier, Beatriz Rodrìguez-Labajos and Leah temper. In EJOLT, I enrolled in the PhD program and worked as research assistant. I was in charge of the moderation of conflict cases collected in the EJAtlas platform, the Global Atlas of Environmental Justice. Over the years, I also assisted in the general coordination, expansion of the network of collaborators, as well as in technical improvements and consolidation of the platform. EJOLT gave me the opportunity to engage with a large network of environmental justice organisations, such as Acción Ecológica (Ecuador), Environmental Rights Action (Nigeria), GRAIN (global network working on food sovereignty), Centro Documentazione Conflitti Ambientali (Italy), as well as with politically engaged academics like Patrick Bond from South Africa and scrupulous officials such as the general attorney Antonio Gustavo Gomez from Tucuman, Argentina.

In the same years I could also participate to several events of the Political Ecology network ENTITLE, where I found amazing colleagues and friends as well as a precious academic training. These include the extraordinary Summer School of Political Ecology "Commons, Conflicts, and Disasters" in Syros, Greece, in 2013, with Giorgos Kallis, David Harvey, Erik Swyngedouw, Maria Kaika, Gavin Bridge, among others.

After EJOLT ended, I contributed to the conceptualization and writing up of a seed grant proposal to the International Social Science Council with the aim of expanding the EJAtlas database and of engaging deeper in methodologies of co-production. The seed grant gave me the opportunity to present the mapping tool to other organizations working on environmental justice issues to try to expand our network, such as to the team of the Indian NGO Kalpavriksh in Pune and other organizations in Delhi, to members of Focus on the Global South and Thai Climate Action Network in Bangkok,

and to the Environmental Justice Centre in Colombo, Sri Lanka. These and other contacts and collective work carried out by other colleagues in North Africa, West Asia, and Latin America made the seed grant successful. We later received funding for the three-year ACKnowl-EJ -Academic-Activist Co-Production of Knowledge for Environmental Justice project (2016-2019, funded again by the International Social Science Council), where I worked for one year. It was a pleasure to engage with these extraordinary activist researchers and with the two co-directors dr. Leah Temper and Ashish Kothari.

In 2017 I joined the ENVJUSTICE project (2016-2021), where I continued in my role of coordinator of the EJAtlas and scientific co-coordinator of EJAtlas related research.

During all these years, particularly enriching was also the experience of supervision of two master thesis on dam conflicts and about six internships with the EJAtlas, classes and workshops for the Degrowth Summer School, as well as the collaborative creation of several Featured Maps, by-products of the EJAtlas project. These include the Map of Chevron-Texaco conflicts in collaboration with UDAPT (Ecuador) and the Blockadia Map (together with Alice Owen, Daria Rivin, Brototi Roy and Andrea Cardoso).

Constant engagement with civil society organizations, movements and networks has deeply inspired and informed this dissertation. The thesis includes three central chapters, based on fieldwork and co-production of knowledge. Chapter Four presents and discusses the results of fieldwork in Himachal Pradesh (India) and is co-authored with Kesang Thakur, MA, local independent researcher and member of Himdhara collective. The chapter was presented as an article in two academic conferences, the IV Conference

on Social Sciences and Dams at Universidade Federal da Fronteira Sul (UFFS), Brazil in 2016 and at the Conference of the International Society of Ecological Economics in Budapest, 2017. The article was submitted for revision in the journal Water Alternatives. Chapter Five is based on comparative and statistical analysis of the EJAtlas database, and is co-authored with my colleagues Arnim Scheidel and Leah Temper. It is published in Sustainability Science as Del Bene et al. (2018). Chapter Six is based on multi located fieldwork I carried out across several years. It was presented at the Latin American Studies Association (LASA) conference in Barcelona, 2018, and in the online seminar 'Water Justice and the Commons' organized by Routgerd Boelens and Sergio Villamayor, 2018. It will be submitted to a journal by July 2018.

This thesis was finalized in June 2018 at the Escola de Ecologia Política de Palautordera. All my best wishes for this new space for collective thinking, writing, creating, conviviality, and for Joan for warmly welcoming us all there.

My gratitude to

Giorgio, per il tuo amorevole supporto in ogni momento
Alla mia famiglia, al mio papá e alla mia sorellina, per il vostro appoggio incondizionato, nonostante la distanza. Grazie, famiglia!
Ai nonos, pai vuestris ricuards e lis vuestris storis

A coloro che sono qui e a quelli che da lassú sempre accompagnano

And to

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The continous inspiration, empathy and friendship of Ashish Kothari, Arturo Escobar, Amita Baviskar
The members of the thesis defence tribunal for making the time to read, come, and engage

Old friends Samantha (I still have the floppy disk of your thesis on 'giustizia ambientale'!), my school friend and legal advisor Cristina, the best photographer on planet Earth Erika, to Genni and her love for justice and humanity, a la Nena e tut el meravillos che te son, to the entire family of la Tenda and of CeVI

New friends at ICTA, the amazing ENVJUSTICE team and its advisory board, the transgressive ACKnowl-EJ members and the pluriverse of Research&Degrowth; and then Santi, Raul, Melissa, Lucha, Camilo, Maria, Lucia, Dylan, Amelie and many more. Your enthusiasm and joy of learning and understanding this crazy world is so contagious!
Mil gracias a la administración por el trabajo de suporte en todas las fases del doctorado
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La Xarxa per la Sobirania Energetica (XSE), el Observatori (ODG), y Alfons, Monica V., Annalies, Monica G., Arturo… amb vosaltres el activisme es re-existencia alegre, creativa i amb curas per tots i totas

The inspiring communities and movements resistiendo y re-existiendo en sus territorios de vida, paz y alegria (muy agradecida especialmente a Juan Pablo, Tatiana, Ivonne, Rosalinda, Gustavo, Leo, Madhuresh, Himdhara collective and Kalpavriksh, Kesang, Vimal Bhai, Alok and Silvy)

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La comunitat magica de La Moreria (Ca na Mora, Ca la Figa i Ca l'Aukera) A mis amigos y maerstros de kundalini yoga Bart&Maffe, y León

Los y las muralistas y demás artistas de todo el mundo, que con el arte rebelde denuncian sin dejar de buscar los colores y la paz (Gracias a los artistas del mural en la portada!)

The Isonzo-Soča, and all rivers and waters that nurture us and our planet

Warli Adivasi painting. India

List of Figures

List of Tables

Annexes

When you imagine a river,

it is basically the same as a tree.

The main truck is the river,

but you have the brunches or the tributers.

It's a unique ecosystem. It's breathing.

opening words of Blue Heart film

Photo credits: Adriana Franco

1. Introduction

"These days we will receive lots of political authorities
and all kind of experts in our territory.
They will go to the dam site, they will remember the victims,
bring flowers and promise this will never happen again.
We, the people who now live here, we don't want to 'commemorate'.
We want to make that 'memory alive',
by changing the roots of the problem.
We question the power structure that allowed 2,000 people to die
and then left an entire valley abandoned."

These opening words belong to Valter Bonan, the counsellor for participatory democracy and the commons of the municipality of Feltre, a little town in the province of Belluno, in the north of Italy. I visited the area in 2013, together with a group of local neighbours and activists of the local 'Comitato Bellunese Acqua Bene Comune', concerned with the construction of a hydroelectric dam and diversion of mountain rivers. It happened to be the 50th anniversary of the Vajont disaster, when a piece of Monte Toc fell into the reservoir waters of the Vajont dam, some 50 km upstream from Feltre. The impact provoked a huge wave that overflew the dam infrastructure and wiped away the life of two thousand people (See Figure 2.1). In 2013, politicians across different parties and state representatives participated in the commemoration of the victims and attracted media attention from Italy and abroad. Valter was against the participation of the town council in this public event. Instead, those days Feltre hosted a conference on the local legacy of the tragedy today, on current conflicts around Italian company-owned plants in Latin America, and on current plans for the exploitation of hydropower in Alpine rivers. He argued that if we do not question the structure of power in

decision-making and in the debate on what energy we need and for what, there is no reason for commemoration. It would just be an arrogant self-justification and hand-washing, but would not prevent other human or capitalism induced disasters (Huber et al., 2017). What Valter and his town council wanted to focus on was instead the search for alternative ways to produce electricity under different regimes of ownership and management of the infrastructure, while at the same time promoting more sustainable lifestyles.

Feltre's experience captures the main contentious issues that inspired this thesis. The Vajont tragedy and its legacy today in the whole province is remarkable but not unique. The last seventy years of dam building across the globe are spotted with disasters (among which the currently unfolding drama in Ituango, May 2018, Colombia. See EJAtlas, 2016c) and severe conflicts over local impacts, disruption of communities and territorial bonds, and consequent acts of repression and criminalisation. The renovated interest in dam building today under the discourse of 'sustainability' and 'green energy' is further exacerbating the consequences of massive infrastructural interventions onto old and new territories. Despite the greening discourse, we still register an increase in social metabolism worldwide which will likely aggravate local and global inequality (Martínez-Alier et al., 2010). Social conflicts and struggles are increasingly grounding themselves on ecological issues, whereby these legitimate or contest both scientific and political practices, a process defined as 'environmentalisation' (Acselrad, 2010). Bellamy Foster notes that "the struggle for material welfare is increasingly taking on a wider more holistic environmental context", positioning the "*struggle over the interrelationship of race, class, gender and imperial oppression and the depredation of the environment as the defining feature of the 20th century*" (Foster, 2002). In other terms, opposition to capitalism-driven accumulation and to the socio-ecological impacts of social

metabolism is increasingly being disputed over environmental/ecological terms.

At the same time, social change and alternative practices also have to engage with the ecological and biophysical dimension, as top-down schemes, such as better management, higher compensations, more efficiency, more conservation, etc have fallen short in tackling impacts and inequality and have even generated more conflicts.

This dissertation responds to the need to inquire into why and how dam related conflicts are today increasing in terms of not only number and geographical extension, but also in terms of violence and intensity. At the same time, this work has been shaped and oriented through an activist perspective and has maintained a focus on the social transformations that happen within and through resistance. This introduction to the thesis provides below an overview of its theoretical foundations. Next, an outline of the thesis and research questions will be provided.

1.1 Conceptual review and theoretical background

This thesis takes Environmental Justice and Political Ecology as its main points of departure and analytical lenses. Environmental justice (hereafter EJ) can be defined as both a social movement and a research subject. Political ecology (hereafter PE) has been provocatively referred to as an 'undisciplined discipline'[2]. As such, political ecologists and readerships are inherently diverse, and range from academics across the social and natural sciences, grassroots activists, organised collectives and organisations, journalists, politicians, etc. EJ scholars and political ecologists are also *migrant*, as their texts can be found in academic journals, but also in blogs,

[2] https://www.ces.uc.pt/undisciplined-environments/

social networks, newspapers, magazines, etc. It's an (in)discipline that invites one to challenge concepts, methodologies and discipline boundaries, to reinvent and adapt them to the field, *en la calle*, to engage from within, feel part of and empathise with the topic being studied. In the following sections key features of EJ and PE in relation to the content of this dissertation will be outlined.

1.1.1 Environmental Justice as an expanding framework

Since its inception in the US in the 80s, EJ scholars sought to draw attention to how minority communities suffered disproportionately from environmental hazards (Bullard and Wright, 1990), and primarily focused on groups resisting the imposition of toxic and polluting facilities in minority and poor communities. Over the years, EJ theory has expanded into multiple fields, from academic work to activist campaigns, and now serves as a crucial rallying ground for social activism and political resistance. According to Sikor and Newell (2014), EJ provides "a powerful lens through which to make sense of struggles" over resources globally, as well as a theoretical meeting ground for (global) political ecology, and the multiple environmentalisms of Northern and Southern countries (Guha and Martinez-Alier, 1997; Guha, 1989; 2000).

Authors like Walker (2009a; 2009b) warn about the fact that EJ has become an evolving and far-reaching frame for understanding and acting on socio-environmental issues, but at the same time the concept is subject to necessary and also problematic processes of recontextualisation. In this same line, both Debbane and Keil (2004) and Williams and Mawdsley (2006) argue that the geography of environmental justice matters, in that it cannot be universalised under one conceptualisation, but has to be defined within the context for each site in which it is used. Beyond these words of caution, more sceptical

positions of authors such as Harvey (1996) or Swyngedouw and Heynen (2003) hold that protest movements are more separate or stand-alone initiatives, 'particularistic' often characterised by a localistic perspective, or 'nimbysm' (Horowitz, 2012).

As a response, and echoing Kalan and Peek (2005), we can argue that the US movement does not need to have a monopoly over the concept, and that people have been resisting and advocating for similar goals, although they might not call these environmental justice. While analysing the evolution of the EJ framework in the US over a 20-year period, Benford (2005) stresses the fact that frames are not given and static. On the contrary, they are open to continual redefinition and reformulation, and this happens through an active work of framing. The framework, in fact, rather provides a 'vocabulary of political opportunity' (Agyeman and Evans, 2004), i.e. a language with which to speak up and find interlocutors across the globe, to come up with transversal diagnosis of the problem people face and to discuss different and differing (otherwise said, alternative) visions and life projects (Escobar, 2008).

In doing so, scholars hold that 'original' EJ concerns are being recontextualized in the political and economic reconfigurations of nowadays (Agyeman and Carmin, 2011). According to Walker, for example, EJ has expanded both 'horizontally' and 'vertically' (Walker, 2009b). The author shows in fact how its narrative has been adopted through processes of diffusion, reproduction and contextualization across countries, languages, cultures, influencing the way issues are framed, problematized, and thus understood. Examples can be found, beyond US borders, in South Africa (Bond, 2000), Russia (Agyeman and Ogneva-Himmelberger, 2009), Great Britain (Agyeman and Evans, 2004), Canada (Agyeman, 2009), Australia (Lloyd-Smith and Bell, 2003; envirojustice.org.au), Brazil (Porto and

Finamore, 2012), among others.

Similarly, EJ has also expanded across scales, i.e. 'vertically', to encompass concerns beyond national borders, and which sometimes involve political relations between countries. This includes a whole range of issues from opposition to dams (Sneddon and Fox, 2008), water (Bakker, 2003a; Barlow and Clarke, 2003; Boelens et al., 2018), food (Alkon and Agyeman, 2011) land grabbing and finance (Clapp, 2014), mining (Cardoso, 2015; Urkidi and Walter, 2011), trade agreements (Clapp, 2003), transfers of wastes (Clapp, 2001; Pellow, 2007), climate change (Chatterton et al., 2013; Featherstone, 2005; Klein, 2014), Indigenous peoples (Westra, 2008), among others.

EJ has further spread through organisations, such as Friends of the Earth, born in the US as a 'white' conservationist movement, but which then opened to pluralist visions and practises and was joined by EJOs that had existed since the 1980s, like Asociación Centro Nacional Salud, Ambiente y Trabajo (CENSAT) in Colombia and Wahana Lingkungan Hidup Indonesia (WAHLI) in Indonesia. Many other important environmental organisations include the CSE in Delhi and Acción Ecológica in Ecuador, which linked the idea of environmentalism of the poor with wider notions of EJ and also climate justice.

Martínez-Alier et al (2016b) argue that there is evidence of a growing '*global* environmental justice movement', coming from grassroots movements and concepts, and invite the academic community to take their proposals seriously. The authors give two main reasons for this: a) because local events belong to classes of conflicts that appear regularly elsewhere in the world (e.g. open-cast copper mining, oil palm plantations, or dams), or b) because they raise the conflict issue to a global level through movements' connections (i.e. the 'vertical' expansion described above). Somehow similarly to the

global feminist movement, the authors argue that the global EJ movement "shares some common goals, frames and forms of mobilisation, although obviously there is no single united organisation in charge, no politbureau or central committee." (Martínez-Alier et al. 2016b:17).

Sikor and Newell (2014) argue that claims of environmental (in)justice not only operate at a global scale but help to *produce* a global scale. Practices and protests might arise from locally felt impacts, but often articulate with other groups who are facing similar issues. Assembling actions of activists and researchers in fact contribute to increase awareness of the interconnection of economies and subsequent uneven 'development', but also of affections. Examples can be found in the creation of trans-national environmental justice organisations that unite under a common issue, such as Oilwatch, or the World Rainforest Movement, or for being affected by the activities of one actor, such as the Articulacão Internacional de Atingidos e Atingidas pela Vale[3]. In the case of dams, several regional groups have been formed, while internationally the NGO Rivers International operates as a global reference and information hub (a history of its formation can be found in Khagram, 2004).Environmental Justice has thus increasingly taken on a trans-national and trans-disciplinary character, serving as a meeting point, a dialogue and forum for action-research among a growing network of activists, scholars, and non-governmental organizations. Therefore, it serves as an important lens to critically analyze political and environmental transformations in a mutually informing dialogue between theory and practice, to mutually understand how people all around the world experience such transformations, and to bridge scientific research and social mobilizations.

[3] https://atingidospelavale.wordpress.com/tag/afectados-y-afectadas-por-vale-s-a/

A key concept of EJ is the 'environmentalism of the poor', which was first applied in relation to rural and indigenous populations in India and Latin America, and conceptualised by academics and activists like Anil Agarwal and Sunita Narain of the Centre for Science and Environment (CSE) in India, or Hugo Blanco in Peru. It dismantles the idea that a healthy environment and its preservation is a luxury good that only well-to-do people can afford (Martínez-Alier, 2002). The environmentalism of the poor (and, we can add, of the impoverished, the indigenous, the marginalized, etc) opposes the influential 'post-materialist' interpretation of environmentalism, as well as the idea that environmental risk is impartial to social class (Beck, 1992). It also challenges the still widespread ideas that there is a pristine 'nature' out there that has to be protected, what Martínez-Alier (2002) calls the 'Cult of the Widerness'. Similarly, the third type of environmentalism Martínez-Alier (2002) highlights, the 'Gospel of Eco-Efficiency' also relies on social class neutral values such as eco-efficiency, eco-modernism, eco-technology, and is sometimes replicated in sustainability programs, e.g. large-scale renewable energy schemes.

Since the mid-1990s, an explicit connection between the EJ movement in the United States and the environmentalism of the poor in Latin America, Africa and Asia was established (Guha and Martínez Alier, 1997; Varga et al., 2002) and was consolidated following the deaths of Chico Mendes in 1988, the *serengueiro* fighting deforestation in Brazil, and of Ken Saro-Wiwa and his Ogoni comrades in the Niger Delta in 1995, who exposed and denounced the impacts and violence of oil extraction and gas flaring by the Dutch company Shell.

This 'environmentalism of the poor' today increasingly manifests itself as an 'environmentalism of the dispossessed' (Temper, 2014), a term referring to a politicised environmentalism cognisant of the dialectic between expanded capitalist accumulation at a global scale and environmental dispossession,

and often motivated not only by local material concerns but also at broader scales by opposition to dispossession of sovereignty. The poor are in this case the newly impoverished sections of the society, but also rather well-of urban and rural citizens, who become aware of the ongoing dispossession processes that are affecting them too (e.g energy poors in big cities, corporate exploited workers in unhealthy working conditions, etc).

In Temper and Del Bene (2016), it is argued that the globalisation of EJ issues invites four key reflections. First, EJ is leading to a much more relational understanding of how we are connected, including on an intergenerational dimension. The literature on ecological debt is an eloquent example (Goeminne and Paredis, 2009; Warlenius et al., 2015), as well as those works that highlight how processes at one scale impact those at much larger scales along a chain of accumulation (and dispossession) (Robbins, 2014).

Second, EJ calls for new solidarities and alliances, for example with labour movements (Barca, 2012; Gould et al., 2015; Obach, 2004), ecofeminists (Di Chiro, 2008), and urban activists (Özkaynak et al., 2015).

Third, a globalising EJ unveils the structural and political dimension of environmental problems that cannot be solved apart from social and economic justice (Szasz and Meuser, 1997). Only a transformative approach and the restructuring of dominant economic models, social relations and institutional arrangements can address social, political, economic and environmental inequities. This approach disavows the promises of the "green economy" (Okereke and Ehresman, 2014) or the solutions proposed by the mainstream discourse of sustainability and green transformations (Scoones et al., 2015).

Lastly, EJ is developing a new understanding of the environment beyond the "place where we live, work and play" to encompass a multidimensional materiality based on a consciousness of the innate interconnection of existence on Earth and concomitant power relations.

This move expands the concept of 'justice' beyond the three dimensional understanding of distribution, participation, and recognition, which have usually defined it (Schlosberg, 2007), and adds to the 'capabilities' principle developed by Sen (2009) and Nussbaum (2006), i.e, the ability to live lifes considered meaningful and worthwhile. First, justice is increasingly understood from a relational perspective, to include diverse ideas of justice embedded in specific contexts, history, and power relations (see also Boelens et al., 2018), as well as in relation to non-human beings and a specific territory (De la Cadena, 2017; Ulloa, 2017). This becomes particularly relevant when we look, for example, at EJ in relation to resistance of Indigenous peoples, which has to include claims to sovereignty to land-territory as well as over the *cuerpo-territorio*, along with questioning the liberal notions of collective action and citizenship (Keeling and Sandlos, 2009; Maldonado et al., 2013; Ulloa, 2017).

Second, environmental justice urges to incorporate the epistemical, cognitive, and ontological dimension to engage with decolonising processes and emancipation. Conflicts over the environment in fact become epistemic struggles, wherein other forms of the political, other economies, other knowledges are produced and theorized to question hegemonic worldviews and the imposed 'epistemical' and 'ontological extractivism', as underpinning conditions for an economic extractivism (Betasamosake Simpson, cited in Grosfoguel, 2016). As a "citizen science", EJ activists and communities in resistance engage in a range of strategies, also termed "knowledge practices", to produce, modify and mobilise counter-hegemonic

knowledge (Casas-Cortés et al., 2008) and to reclaim epistemic and cognitive justice (Grosfoguel, 2016). Through these processes, impacted communities transform from 'vulnerable' (or 'vulnerabilized') to collective active subjects, bringing about an innovative sense of political participation and re-invigorating political and social imaginaries (Porto and Finamore, 2012). They also reclaim the right to be both equal and different, defend diverse political relational ontologies and the equal relevance of diverse, plural, counter-hegemonic epistemologies (Escobar, 2016; de Sousa Santos, 2014).

1.1.2 A Political Ecology of resistance: socio-environmental conflicts, the extractivist imperative and transformations

We understand here Political Ecology (hereafter PE) as the study of ecological conflicts, also called ecological distribution conflicts (EDCs), as per the definition given by Martínez-Alier (2002). EDCs can be defined as collective (protests) actions induced by existing or anticipated environmental pollution or damage to natural elements (including human communities), which have been caused or will be caused by increases or changes in the social metabolism, and where powerful actors shift the costs to vulnerable groups (Martínez-Alier, 2002). The term EDCs stresses how beyond economic distribution struggles (for example, conflicts between capital and labour and profits vs. salaries), there exists struggles over ecological distribution (O'Connor and Martínez-Alier 1998), which include unequal exposure to pollution, as well as unequal access to energy, fuelwood, green spaces, etc. EDCs can be local, regional, or global. They often occur between the global South and the global North, i.e. communities in rural Brazil affected by Chinese mega dam, or residents in European cities affected by large-scale construction expansion funded by global capital. However, there are also many local conflicts within a short commodity chain, e.g. on water

diversion for a nearby factory (Martínez-Alier, 2002). Our focus here is however on conflicts as a response to the growth and changes in the social metabolism, i.e. the flows of energy and materials in the economy. This is, we contend, the primary cause of ecological distribution conflicts. As the industrial economy is not circular but entropic (Georgescu-Roegen, 1971), materials are recycled only to a small extent. At the same time, energy cannot be recycled and therefore commodity extraction frontiers be they of coal, oil, gas, wind or hydropower expand. While hydropower can be seen as a renewable flow rather than an exhaustible stock of fossil fuel, its impacts on fisheries, accumulation of sediments, human displacements, groundwater, etc are indeed irreversable. Both growing and not growing industrial economies would require new sources of materials and energy; this makes the notion of commodity extraction frontier pertinent in this analysis.

Conflicts are globally exacerbated because of the increasing pressure of extractivist activities upon territories, human and not human communities (Gudynas, 2016). The term 'extractivism' has been defined and discussed by several Latin American authors and under slightly different lenses. Acosta (2012) defines it as a mode of production and accumulation, Svampa (2013) understands it as a political-economic consensus over a specific narrative of economic growth driven by commodity exports, others see it as a replication of colonisation of Nature (Alimonda, 2011), while Gudynas (2012) stresses the relevance of government royalties as a means to gain legitimisation and public support for the exploitation of resources, especially in new extractive frontiers. The concept was born, shaped and signified in Latin America, but under certain conditions it can explain other contexts too. It is indeed used by environmental justice organizations and networks globally[4]. Some authors

[4] Examples include the network Women Resisting Extractivism (http://femmesenresistance.cdhal.org/en/) and the feminist collective AWID (https://www.awid.org/special-focus-sections/confronting-extractivism-corporate-power), Friends of the Earth for Africa (for ex. https://foe.org/2014-11-disease-deforestation-and-development-ebola-and-extr/), etc.

have however highlighted some weaknesses in the concept. Starting from those, they challenge the notion and invite to expand its framing. Machado Aráoz (2015) makes a distinction between 'extractivism' as the interdependent model of global capitalist production and 'extractivist regime', as a specific national model of governing and economic production over time. He argues therefore that it is not only a national development strategy, but needs to be interpreted within a whole world-system. Why would in fact Bolivia be extractivist and Germany not? Is India not as a whole an extractivist or industrialised economy, and not only some of its states exporting raw material to internal metropols? Second, Mezzadra and Gago (2015) warn about prevailing concepts of extractivism tending to reproduce a rural–urban and beneficiaries-victims dichotomy when discussing the social and socio-ecological impacts of extractivism within national societies. The boundaries are instead not so clear.

Martín invites to rethink the spatiality of extractivism, to carefully avoid the 'territorial trap', i.e, thinking national states as sovereign within a given defined territory (Agnew, 1994), and to analyse extractivism across overlapping territories, as conflictive spaces defined by domination, resistance, and emancipation struggles. Otherwise said, territories for the reproduction of capital vs territories for the reproduction of life (Martín, 2017). The author suggests that "extractivism can be thought of as an expression of political dominance that condenses conflicts and material, as well as the cultural and socio-political dimensions of a regional hegemonic model of development". Along this line, he invites the reader to reflect on the 'marginal areas', produced to serve a specific (development) purpose and not 'get wasted'. At the same time, protesters need to be isolated in order to allow the extractivist utopia to be carried out (Martín, 2017).

Other authors from Latin American lines of thought stress on the key concept of territory and territorialities to understand on one hand the cultural and

ecological attachment to the land and place and the relational making of such territory between humans and non-humans, and on the other hand to grasp the profound disruption extractivism operates (Escobar, 2008; Porto-Gonçalves and Santiago, 2013). This latter is therefore reconceptualised as a mode of re-territorialization, or re-ordering of the territory/place (including human groups) to make way for capitalist and extractive activities (Ceceña, 2004; Teran Mantovani, 2017).

Along a similar vein, Arsel et al. (2016) argue that extractivist activities "enjoy a teleological primacy" as if there were an 'extractivist imperative' that grounds itself in a set of beliefs, such as: a) it is indispensable for a structural economic transformation; b) the state needs to engineer such a transformation from primary commodity exports to higher value added goods and services; and c.) there is an urgency to address poverty and inequality throughout this transition. In this way, the 'extractivist imperative' shapes decisions beyond policies, and includes a mode of development and set of expectations.

The idea that extractivism goes beyond the materiality of extraction, and includes a whole array of practices and crimes against different cultures and world-visions since the dawn of colonialism, can be found in the works of several authors. With the concepts of 'cognitive' or 'epistemic', or 'ontological' extractivism, Grosfoguel (2016) for example argues that knowledge can also be 'extracted', appropriated, and given a new interpretation and meaning. In other words, "The act of extraction removes all of the relationships that give whatever is being extracted meaning", as argues the indigenous Canadian activist and scholar Betasamosake Simpson[5].

[5] Interview with Naomi Klein, 2013. Available at: http://www.yesmagazine.org/peace-justice/dancing-the-world-into-being-a-conversation-with-idle-no-more-leanne-simpson. Last accessed: 28.02.2018

These conflicts therefore bring value system contests into the open. The language of economics (and of monetary cost-benefit analysis) is usually insufficient to deal with the complexity in place. Mainstream economists claim that all externalities just need to be internalised in the price but reality shows that not everything has a price tag. Ecological and economic distribution conflicts are therefore not coterminous. For instance, if a river is degraded or a forest destroyed by a mega dam, financial compensation may be a way out for the company responsible but other valuation languages (biodiversity, the "rights of nature", the livelihood of local populations, indigenous territorial rights, sacredness, attachment to territory) will then be sacrificed (Lerner, 2010). But often no amount of monetary compensation will prevent a conflict from taking place, simply because people also hold non-monetary social values (Martínez-Alier et al., 2010; Temper and Martínez-Alier, 2013; Zografos and Martínez-Alier, 2009; see also chapter Four of this thesis).

According to Escobar (2008), defining conflicts as EDCS might miss another important component, namely the cultural, in that they manifest themselves in specific power settings, according to specific knowledge and cultural processes. Cultural distribution conflicts (CDCs), following Escobar, "arise from the difference in effective power associated with particular cultural meanings and practices. They do not emerge out of cultural differences per se, but out of the difference that this difference makes in the definition of social life." (2008, p. 14). As power inhabits meaning, struggles over meanings are thus central to the shaping of social as well as the physical world. CDCs reflect the underlying ontological differences, namely the different ways of understanding and creating the world. This is probably the main point of encounter between the PE and the decolonial studies and post-colonial theory, for example in Latin American political ecology (Alimonda

et al., 2017; Leff, 2015) or among intellectuals from India (Spivak, 1988; Joshi, 2015).

With Escobar, we see again the need for an expansion of environmental justice to embrace the epistemical, the cognitive and the ontological. Also, we understand how the economic, the ecological and the cultural are intrinsically intertwined. As such, we shall analyse and unpack socio-environmental or ecological conflicts as well as their potential transformative forces, i.e. those spaces in resistance that result in emancipatory politics, increasing political awareness and enhanced engagement of organized communities and activists.

The current challenge facing movements and communities in resistance is in fact to balance its successes at opposing hazardous technologies and unsustainable development with a coherent vision, policy proposals and "transformative remedies" that can transform and reshape the political-economic structure behind injustices. Not through fixes or compensation measures, and certainly not under the same logic and rules that brought to the problem. As in the citation at the beginning of this introduction, it is often not sufficient to resist or oppose. Resistance sometimes has to transform in order to 're-exist' (*Resistencia o rexistencia*, in the words of Latin American movements). Transformations have been defined as *radical*, i.e. engaging with the roots of the problem but also going to rooted traditional knowledge (Temper et al., 2018b), or emancipatory (Martín, 2018) or else understood as a part of the productivity of the conflict (Merlinsky, 2017). To this end, insightful links and commonalities can be found between EJ movements and other counter-hegemonic visions of the economy and society, such as the commons, degrowth, plenitude, pluriverse, reclaiming of the territory and territoriality, sovereignty, and concepts from the Latin American tradition like *sumak kawsay* (Acosta, 2013b; Kothari et al., 2018).

This discussion has a central relevance for this thesis in that when we inquire into the expansion of hydropower infrastructure globally, we find similar patterns of dispossession, reordering of territories and relations, violence and counter resistance in conflicts around renewable energies and other conflictive activities such as mining or oil extraction. Are large-scale renewables also being promoted following that same imperative and visions of development, progress, modernity? How is the 'extractivist imperative' leading today the expansion of renewables?

1.1.3 Social metabolism, ecological economics, and incommensurability of values

The ecological economics tradition understands social metabolism as the way in which human societies organize exchanges of energy and materials with the rest of the planet (Fischer-Kovalsky and Haberl, 2015; Martínez-Alier et al., 2010). In other words, social metabolism refers to the process by which energy and matter flow and dissipate within the economy.

Ecological economists have shown that globally consumption of both energy and materials is increasing. As the industrial economy is entropic and not circular, commodities extraction frontiers have to expand to meet the global growing demand, leading to greater social confrontation and ecological disruption. Those who are most impacted are usually marginalized and vulnerabilized communities (although not exclusively), thus impacts further generate social inequality in terms of distribution, access to resources, and recognition of specific values.

Social metabolism, although mainly described through energy and material accounting, is rooted in a political and historical context. Therefore, the growing metabolism of our industrial economy mutually generates and is generated by a culture and patterns of consumption and production, division

of labour, and invisibilization (or even repression) of 'deviating' values and worldvisions that do not comply with the capitalist economy. Ecological economics developed the concept of incommensuability and plurality of values and valuation languages to indicate pluralist forms of relation to and understanding of the surrounding environment (Martínez-Alier et al., 1998; 2010). In Chapter 4, we analyse the valuation languages affected communities by hydropower expansion in Himachal Pradesh deploy to complain, to explain affections, and justify their demands.

1.1.4 Water Justice and socioecological integrity

The terms *water justice* or *hydric justice* have been largely theorised and discussed by scholars like Boelens et al. (2018) or Perreault (2014). However, the concept has been unpacked and signified so closely with activists for many years that these same authors would see water or hydraulic justice as being born and coming from environmental justice organizations (Boelens *et al*. 2011; Isch *et al.* 2012). These activist researchers stress on the fact that "water runs towards power" and "water runs towards money", unless perhaps stopped by civil society movements. They argue that calls for water justice take a variety of forms and cannot be ring fenced into one unified principle. These forms range from the struggle over the access to clean drinking water and sanitation (Bakker, 2003a, 2003b; Barlow and Clarke, 2003), to water grabbing and water trade (Mehta et al., 2012), to the (re)configuration of hydro-social territories (Boelens et al., 2016), to the diverse knowledges over water, typically exemplified in relation to indigenous knowledge (Bakker et al., 2018). Boelens et al (2018) argue that beyond the three dimensional conceptualization of justice (distribution, participation, recognition) and the 'capabilities' principle, water justice literature would introduce another component, namely the socio-ecological integrity, which would stress the caring and nurturing socio-natural environments, sustaining livelihood

security for current and future generations of human and non-humans.

As regards dams, canals, and hydropower plants, social movements increasingly consider the grabbing of land and water as inseparable. National networks such as the Narmada Bachao Andolan (NBA) in India, the Movimento dos Atingidos por Barragens (MAB) in Brazil, the Movement of People Affected by Dams (MAPDER) in Mexico, Rios Vivos in Colombia, among others, have arisen in all continents. All are examples of articulated opposition movements to large and destructive dam projects. The organization International Rivers has further served as a convergence information hub to support anti-dam movements (Khagram, 2004; McCully, 2001).

1.2 Outline of the thesis

This thesis is built upon seven chapters, including a Conclusion section that synthesizes the main results and draws lines for future research.

Chapter 1 (partly based on an article published as Temper and Del Bene, 2016) provides a general introduction to the work and the main theoretical fundation, rooted in Environmental Justice and Political Ecology Literature. It also introduces the growing body of literature of Water Justice studies, from which I departed at the very beginning of my Phd.

Chapter 2 introduces the contextual background of the thesis, namely the growing sector of hydropower construction globally and its historical roots in discourses of modernity, nation building, industrialization and economic development, progress, and then lately regaining momentum as a source of sustainable, renewable and green energy. Next, it narrates the emergence of the first strong anti-dam movements and their historical trajectory throughout the last decades. It then shows how the sector is projected to expand in terms of construction and investments, especially due to new actors such as Chinese funders and climate change finance. It finally argues that despite such an increase in installed power in MW, the total share of hydropower to the global energy matrix is not replacing other polluting sources of energy but rather adding to them, thus questioning the pro-hydropower argument of being a key source for ongoing energy transition.

Chapter 3 explains the methodology adopted for fieldwork as a scholar-activist research approach. It discusses the idea of co-production (or co-generation) of knowledge and explains in more detail the nature and the process of data collection of the EJAtlas.

Chapter 4 (based on a paper currently under revision in Water Alternatives as Del Bene and Thakur, forthcoming) describes a collaborative mapping process of 17 dam related conflicts in one of the most recent expanding frontiers of hydropower, the Himalayan state of Himachal Pradesh, India. It asks why are hydroelectric projects conflictive despite being considered as green and sustainable sources of energy? It discusses the valuation languages deployed by affected communities. It shows how renewables expansion is also contentious, beyond the issue of dimension and capacity of the plants. It suggests that the expansion of the renewables' frontier reproduces an 'extractivist imperative' for renewables, which relies on a 'consensus of infrastructures', parallel to Svampa's 'consensus of commodities'.

Chapter 5 (published as Del Bene et al. 2018 in the journal Sustainability Science) is an explorative exercise that analyses in a comparative fashion the global database of 220 dam related conflicts retrieved from the EJAtlas, to our knowledge the largest one existing so far. The preparation of this article was motivated by the criminal attack to Honduran-Lenca activist Berta Cacerés and Mexican activist Gustavo Castro in 2016, as well as by the other many criminal violent actions against communities in resistance we came across with the EJAtlas. It asks why and how is violence becoming so frequent around hydroelectric dams? The chapter enquiries into the type of actors and the forms of mobilization in such contentious grounds, as well as into the intensity of dam conflicts. It specifically delves into four violent outcomes, namely repression of protest, criminalization, violent targeting of activists and assassinations. It explores the correlation between these latter and the presence of indigenous peoples, and discusses the wider environmental, health, and socio-economic impacts where violence unfolds. It finally expands the conceptualization of direct violence against opposition to the extractivist, epistemic and cognitive violence that underpins the former. The chapter is a contribution to moving political ecology from the

local scale to the global one, and to trying to draw trends and patterns of violent repression of opposition to hydropower dams globally.

Chapter 6 (to be submitted to a journal in July 2018) discusses the empirical material collected during fieldwork which points at the transformative forces generated within anti-dam movements. It is intended to contribute to the growing literature on transformations or transformative environmental justice. It asks how are anti-dam resistances contributing to sustainability? How are transformations framed and put at place? It highlights and discusses alternative proposals and sovereignty claims of anti-dam movements in response to land, water and energy grabbing, and to the overall 'sovereignty grabbing' communities and territories face. In particular, it discusses energy sovereignty as an emerging concept of the environmental justice vocabulary of anti-dam movements and their allies to respond to such grabbing and to reconstruct community bonds and territorialities.

Chapter 7 summarises the main lessons learnt and main highlights to the field of political ecology and environmental justice. It finally draws the lines of planned future work.

Hydropower is only the tip of the iceberg
of the dispossession of our territory.
And it's very fast.
Your find out that they are coming
and in four years or less
you find your whole life completely disrupted.
All has changed, you have nothing left.
They say it is for providing green energy and development.
For us it's just destruction again.

Member of Asprocig and Rios Vivos, Colombia. 2017

2. Background: the expansion of the hydropower extraction frontier

This chapter introduces a brief history of hydropower development globally, with a special focus on the last two decades, i.e. after the publication of the "Dams and Development" report (World Commission on Dams, 2000). It touches on the key historical steps in the expansion of the industrial hydropower installations, and of the consequent rise of related social conflicts and protests. In particular it focuses on the historical struggle in the Narmada valley in India and the withdrawal of the World Bank funding to the controversial Sardar Sarovar Dam, which marked a turning point in the dam and hydropower sector. It then briefly describes the global privatization process of the 1990s, and the increasing role of China in overseas dam building. Finally, it discusses the argument of the sustainability of dams and the renewability of hydropower energy that justifies, although does not explain, today's boom in hydropower installation. It finally provides key figures of current state-of-art of hydropower globally.

2.1 A short history of hydropower dams: the beginning

Hydropower is a form of energy generated from water moving in the hydrological cycle, which is driven by solar radiation or, more specifically, the kinetic energy of water moving from higher to lower elevations as it flows to the ocean, driven by the force of gravity. This means turning the hydro-natural cycle (water evaporates by solar energy and returns as precipitation and flows in streams or rivers towards the sea) into a hydro-social cycle (Boelens et al., 2016; Swyngedouw, 2009) with numerous interferences in the form of dams, interbasin transfers, large scale agricultural irrigation and industrial and urban uses of waterways for waste evacuation. This is done at

heavy costs to the natural environment and to other human uses, such as fisheries, livelihood needs, navigation, etc.

Prior to the widespread availability of commercial electricity, hydropower was already used for irrigation pumps and the operation of various machines, such as watermills, textile machines and sawmills. The origins of hydraulic power go back to at least the first century BC (Viollet, 2005). In the 1700s, mechanical hydropower was used extensively for milling and pumping. During the 1700s and 1800s, water turbine development continued and the first hydroelectric power plant was installed in Cragside, Rothbury, England in 1870. The industrial use of hydropower began soon after, for example in 1880 in Grand Rapids (Michigan) when a dynamo driven by a water turbine was used to provide theatre and storefront lighting, and then later in 1881 at Niagara Falls, New York. The breakthrough came when the electric generator was coupled to the water turbine to create the world's first hydroelectric station (of 12.5 kW capacity), which was commissioned in 1882 on Fox River at the Vulcan Street Plant, Appleton (Wisconsin) lighting two paper mills and a residence. The method of alternating current, used today, allow power to be transmitted longer distances and ushered in the first commercial installation of an alternating current hydropower plant at the Redlands Power Plant in California in 1893. During this time, turbine technology was also evolving, and the Francis turbine, the Pelton impulse water turbine, and the Kaplan propeller-type turbine from this period remain the most common turbines used today.

The advances in hydropower technology were also spreading around the globe. Germany produced the first three-phase hydro-electric system in 1891, and Australia launched the first publicly owned plant in the Southern Hemisphere in 1895. In 1905, a hydroelectric station was built on the Xindian creek near Taipei, with an installed capacity of 500 kW.

This was quickly followed by the first station in mainland China, the Shilongba plan in the Yunnan province, which was operational by 1912 with installed capacity of 480 kW; today it remains operational with an increased installed capacity of 6 MW.

Hydropower was also implemented under colonial rule, for example in Africa by the British in Cape Town and Nairobi to serve urban consumption and by the French in Algeria for zinc production (Showers, 2011). Plants with large water storage were later introduced, such as the pioneering endeavour of the enlargement of Egypt's Low Aswan Dam in 1912, which prompted a consortium of German and Italian companies to propose the addition of hydroelectric generation and an adjacent nitrogen fertilizer factory. According to Showers (2011:197), "the magnitude of central African hydro-electric potential was a tantalizing frustration for turn of the twentieth century colonial governments because there were no identifiable customers within range of transmission. Large hydroelectric plants remained a fantasy until technological improvements and the development of industrial and manufacturing bases created economic viability." An important boost in hydropower installation in Africa began in the 1930s and grew together with the mining sector, expanding during the post-World War II demand for minerals, European reconstruction programmes, and the associated economic boom in Europe and North America.

Since the turn of the twentieth century, the size of hydroelectric projects increased significantly, accompanied by the engineering of larger reservoirs and taller heads. In Europe, over the first two decades hydro dams proliferated particularly in Scandinavia, in the Alps, and in the Pyrenees. Norway for instance had hydropower (and later a combination of hydropower, oil and gas) as the leading source of energy for the country

(Hveding, 1992) and the company Norsk Hydro, funded in 1906, the key actor in this turn. In France, hydropower boosted industrialisation especially on the Rhône and Garonne rivers and in the Alps (in some cass since the 1880s) (Viollet, 2005). The issue of transportation of hydropower still hindered a large scale exploitation by the industries and cities.

After World War I engineers worked extensively on transmission lines and the interconnection of plants, meanwhile politicians were drafting concession laws, declaring water management as an issue of public interest and thus excluding any opposition to water captures and infrastructure. These provisions were the basis of the establishment of an hydropower regime for the industrialization France, further expanded over the decades to come through '*grands aménagements combinés*', such as reservoirs, pump stations, multiple purpose dams, interbasin channels, etc (Viollet, 2005). In Spain, especially during Franco's dictatorial regime, a large scale construction plan of hydropower plants and irrigation schemes was carried out throughout the country, with around 600 dams built between 1939 and 1975 (Vallarino 1992, 67; cited by Swyngedouw, 2015), pushing into the future disputes over allocation of water and ecological impacts (Saurí and del Moral, 2012). 'Hydropower colonialism' in the Italian mountains was charged with "special patriotic meaning" and "promised to free Italy from its servitude to coal and other fossil fuels imported from abroad" (Armiero, 2011). This enthusiasm, especially at the beginning of the twentieth century, brought industrializing Italy to the third place of the global rankings for hydroelectricity production in 1905, accounting for seventy per cent of its energy share (Ciano 1993, cited by Armiero, 2011). The fever for the 'white gold' continued throughout the fascist era in Italy, where the 'electric mountains' evoked the idea of a wild nature made suitable and tamed for the modern landscape of productivism and tourist exploitation (Armiero, 2011). The history of hydropower development in Italy is today dramatically remembered for at

least two major disasters, the Gleno dam collapse in 1923 killing around 356 people in Lombardia region, and the Vajont tragedy, which killed around 2,000 people in 1963 (see Figure 2.1)

The Vajont disaster – a chronicle of a tragedy foretold (EJAtlas, 2015d)

In 1943, the Adriatic Society of Electricity (SADE), received the state concessions for the construction of a dam on the shore of the river Vajont, on the Mount Toc (which in local dialect means “piece, fragile, that can break”). The dam was going to be among the largest ones int he world at that time; construction began in 1956 and was completed in 1959. The company proceeded to carry out in record time the land expropriations necessary for starting the work, sometimes using excessive pressure and force toward local inhabitants. Within a few years, of the 5,200 acres of township, 3,000 had become property of SADE. Local residents fought against the expropriation of land and exposed flaws in the project. They formed two committees (Committee for the Defense of the Municipality of Erto and Civil Consortium for the Re-birth of Val Ertana) whose requests and complaints were never heard.

On March 22nd 1959, a first landslide collapsed in the water basin after the first water filling, which alarmed local inhabitants and urged journalist Tina Merlin to write about the issue. She was summoned for spreading false information and for contributing to public disorder. Despite that, the dam reservoir was completely filled and entered into operation.

By March 1963, the plant had officially become property of the new National Agency for Electricity, today's ENEL. In the meantime, the friction between the local authorities and the SADE had become very serious. A danger warning came in with a strong earthquake, estimated at around 7 degrees on the Mercalli scale, which caused the collapse of some houses, while others were seriously damaged.

Despite these alarming signals, no precaution measure was taken by dam authorities. Finally, on October 9th 1963, the landslide of the slopes of Mount Toc, already in progress, took a hasty movement. The slide caused a wave surge up to 200 meters, which overpassed the dam structure and swept away entire towns along the river valley: Longarone, Pirago, the banks of Fornace, Villanova, Faè and Castellavazzo.The final count for the accident was 1,917 victims of which 1,450 in Longaronem, 109 in Codissago and Castellavazzo, 158 in Erto and Casso and 200 from other municipalities.

After decades of trials, the predictability of the landslide was never recognized. In 1997, the company Montedison (which had acquired SADE) was ordered to compensate the municipalities affected by the disaster. The affair ended in 2000 with an agreement for the distribution of the burden of compensation between ENEL, Montedison and the Italian government (33.3% each) (EJAtlas, 2015d).

Figure 2.1 The Vajont disaster. On the left, the cover page of the newpaper l’Unitá on 11th October 1963 announcing “Thousands of deaths” and that the “Tragedy could have been predicted”. On the right, a picture of the Vajont dam structure today. Photo Credits: Daniela Del Bene

In the US, in 1920, the US Army Corps of Engineers was authorized by Congress to build hydroelectric plants in the country, and in 1929 Candlewood Lake was submerged by the first large-scale pumped-storage, Rocky River Plant in New Milford. In the 1930s, the Tennessee Valley Authority was created, tasked with controlling flooding and opening up the Tennessee River for navigation. The TVA was going to soon become the main reference authority in relation to dam construction and river management worldwide. The 1,345 MW Hoover Dam, one of the most famous hydroelectric projects in history, was completed on the border of Nevada and Arizona in 1936, aiming to provide irrigation water, floods control, and power supply. Hoover, Shasta and Grand Coulee dams, among others, were however also significantly contributing to the US war industry in the 1940s, and for Native Americans they brought large scale land dispossession, loss of sacred sites, cementeries, salmon fisheries, etc (McCully, 2001). Worthy of note is the fact that in most of the cases, as for example in the Tennessee Basin, local populations did not benefit from the electricity generated, despite billions of dollars being spent from public taxation on hydropower development (Chandler, 1984).

These first big projects generally tended to be glorified in the official records as engineering wonders, growing the national economies through industrialization and progress. Opposition at that time may have not been as widespread as today, or perhaps there are simply few records about protests and complaints. Of those we know of, they share similar patterns of dispossession and imposition of an unequal burden of negative impacts onto certain sections of the society. For example, political scientist Rajendra Vora's book *The First Anti-Dam Movement* reports upoon the peasants of Mulshi Peta, near Pune (India), who in the 1920s protested against the construction of a dam being built with government support by the industrial

magnates Tatas. In Vora's words, "As the Satyagrahis[6] saw it, this was not merely a struggle between the Mawalas [as the Mulshi peasants were known] and the [Tata] company, but a struggle between two versions of economics. As long as the government could not prove that the scheme was necessary in the public interest, it had no right to take away anyone's land. [...] The submerging of the vast tract of land which was the cradle of Maratha history was therefore an act of tyranny, and injustice. It was being undertaken to fatten the dividends of a private company" (Vora, 2009).

Whether or not this was the first anti-dam movement ever is hard to say. There are records for example of the 1916 struggle in Haridwar, led by *pundit* Malviya, against a dam at Bhimgoda, on the Ganges river, India. In this case, it was the religious argument which mobilized protestors, mainly members of higher Hindu classes, *brahmans*, dynastic rulers, and politicians, on the basis that a hydropower dam on the sacred Ganges would dirty the pure holy waters in one of the most sacred spots for the Hinduism (Chapple and Tucker, 2000). Despite the quite different terms of conflict (note for example that Hinduist notions of sacredness of water and rivers are also used to exclude Dalits, as shown for instance in Sharma (2017)), it still shows how different valuation languages and power struggles between classes and castes were coming into play around large water infrastructures.

2.2 Hydropower goes global: the industrial turn of hydropower and the spreading of opposition

From the 1960s through to the 1980s, large hydropower developments were carried out in Canada, the USSR, China, Latin America, Africa,

[6] Sathyagrahi is a common term in India for non-violent protesters, a word introduced by Gandhi.

Indonesia, India, and elsewhere (McCully, 2001). During these decades, dams were increasingly designed to meet multiple purposes. Hydropower components were in fact added to larger water storage and flood control systems.

In Canada, Quebec, Ontario and British Columbia have been the most active provinces in the sector (Waldram, 1988). From 1920 to 1950, hydropower accounted for over 90 per cent of Canada's total generating capacity. Hydro's share however declined after 1950, due to the competitive costs of other energy sources. Nevertheless, in the 1960s high voltage transmission technology revolutionized the electricity industry and made it possible to exploit hydroelectric resources across Canada. However, increased opposition to large hydroelectric projects by environmentalists and First Nations forced the postponement or cancellation of several proposed developments during the 1980s and 1990s, such as the Site C dam on the Peace River in British Columbia (today recovered and promoted under green energy initiatives, see EJAtlas, 2017j) or the Great Whale project in Quebec.

In the 1960s, in the Soviet Union, the Hydroproject Institute was in charge of hydropower installation. It was a subdivision of the intelligence service, and coordinated forced labour at the construction sites (McCully, 2001). Only labour from gulags could in fact provide the human workforce required to undertake large scale endeavours, such as the Dneprostroi dam on the Dnieper river, or the Kuibyishev dam on the Volga. The major rivers of the European side of the USSR soon became a series of polluted reservoirs. At this time, the Hydroproject Institute brought the technologies to Siberia, Central Asia and the Caucasus, as well as to ‘developing countries’.

China greatly increased the construction of hydropower plants during the Great Leap Forward of the late 1950s. McCully (2001) defined the pace of construction as “breakneck”, with an average of over 600 large dams built every year in China in the three decades after the revolution. The second dam building period between 1960 and 1980 was probably the most intensive, and the rush resulted in massive forced displacements and catastrophes. This included the failure of the Banqiao Dam in Henan in 1975, where rainwaters burst the dam and flooded the lower area. The huge wave, 10 kilometers wide and 3-7 meters high rushed downstream at 50 kilometers per hour, killing an estimated 26,000 people from flooding and another 145,000 afterward as a result of epidemics and famine (EJAtlas 2017k). During the period between 1980 and 2000, corresponding with broad political and economic reforms, fewer dams were built but they were of a larger size, and proportionally more projects were built primarily for hydropower than for irrigation and flood control. China imported more foreign technologies and cooperated more with foreign engineers and equipment suppliers, as well as with multilateral banks and financial instiutions outside China (McDonald et al., 2009).

In Africa, colonial powers promoted large hydro expansion around mining sites and industrial plants, especially energy intensive aluminium production. A ‘Congolese Ruhr’ would be created by the Inga falls, and further industrialization took place on the Volta River in Gold Coast (now Ghana) to power a bauxite processing plant (Showers, 2011), the Akosombo Dam, also known as the Volta Dam. The problematic issue of the long distance transmission of electricity was successfully overcome with the grand works at the Kariba Gorge on the international Zambezi river, completed in 1959. According to Showers (2011), “Connecting a ‘remote, undeveloped site’ with urban and mining areas more than 550km away using 330 kV transmission lines was a technological breakthrough that confirmed Britain

as a major dam-building nation". With the Kariba dam (EJAtlas 2015a), the era of large-scale African hydroelectricity had begun, and the exploitation of distant eco/hydrosystems by cities increased (Showers, 2002).

Later, governments of independent nations continued along this path of mega water and energy infrastructure construction, and contracted new foreign debt either through development agencies or bilateral agreements. Support was given by agencies such as the World Bank and United Nations Development Program, and 'aid' agencies such as USAID (McCully, 2001). Ideas of pan-African projects remained in the agenda; one of the major examples is the harnessing of the Congo River's immense flow to generate power for the African continent, which has been in the agenda of energy planners and politicians for nearly a century. As part of this plan, Inga I was installed in 1972 and Inga II in 1982, after which construction came to a standstill until the current plans for the giant Inga III dam, or Gran Inga (EJAtlas, 2016j). During the colonial era large hydro provided electricity for mining and industry, such as the Akosombo dam in independent Ghana, designed in the 1920s to serve the capital city; it was reshaped by the country's founding leader Kwame Nkrumah in the 1950s as a central undertaking for a modernization program and rapid industrialization, and the smelting of bauxite and production of aluminium. The dam was finally completed in the 1960s and displaced 80,000 farmers (EJAtlas 2016c).

Latin America has experienced rapid hydropower growth over the last decades (International Hydropower Association, 2017; Rubio and Tafunell, 2014). The rise of hydropower cannot be attributed only to the impact of the oil crisis of the 1970s in some countries and the desire to diversify their energy mix, but also to the growth of energy consumption in general and in particular to the export of minerals. Hydropower development accelerated

from the 1980s onwards as technology and expertise in the region was enhanced and became more cost-effective (Rubio and Tafunell, 2014).

In Brazil, although the sector started at the end of the nineteenth century, important advancements were made during the governments of Vargas and Kubitchek the 1950. The objective was to follow a comprehensive plan to develop the electricity sector in the country, with financial assistance from the International Reconstruction and Development Bank (IRDB) and American ExIm bank. Following the model of the Tennessee Valley Authority, the Companhia Hidroeléctrica do Sao Francisco was founded in 1948 to operate the 180MW Paulo Alfonso hydroelectric plant. In the 1950s, the Centrais Elétricas de Minas Gerais (CEMIG), the electrical utility company of Minas Gerais, was also created and became a model utility provider in Brazil. The same engineers were later appointed for the implementation of the Itaipu dam project and power generation system on the Brazilian-Paraguayan border, at that time the largest hydropower complex in the world, preceding the Three Gorges system in China (Leite, 2009). In the 1960s, the consolidation of the sector under the Electrobras company gave a new boost to hydropower development. The decades of 1970s and '80s were characterized by the increasing mobilizations by social movements resisting the hydro-projects because of their ecological and social impacts. Three major regions of oppositions were the North-East around the Itaparica dam, in the North opposing Eletronorte's plan for Tucurui dam, and in the South along the Uruguai river and the Itaipu dam, where a first anti-dam movement was born. The Coordenação Regional dos Atingidos da Bacia do Rio Uruguai (CRAB) denounced industrial large-scale energy production at the expense of local affected people. These hydropower plants were not primarily meant for meeting energy needs of the country, but in fact to consolidate industrial plants. The Tucurui dam in the Brazilian Amazon near Belem was an example (as in Akosombo dam in Ghana and in Cahora

Bassa dam in Mozambique) of the link between hydropower and aluminium exports. Built in the late 1970s in the Tocantins River, it was inaugurated in 1984 and resulted in social and environmental disasters of great proportions. Since then, Tucuruí megadam has been providing energy to the aluminum industry at subsidized rates. Over the late 1970s, and building on the activities of CRAB, communities and political activists across the country started to organize in what was going to become one of the most powerful and influential anti-dam movements in the world, the Movimento dos Atingidos por Barragens – MAB.

Other countries in Latin America also experienced a vast promotion of hydropower across the country in the decades of the 1950s and '60s. In Chile, the sector has grown since the 1960s under the control of Endesa, a state enterprise created in 1943 with responsibility for production and transmission of electricity, and particularly to develop the country's hydroelectric potential (Susskind et al., 2014). In 1968, Colombia created the Instituto Colombiano de Energía Electrica (before Electraguas) and the public company Interconexión Eléctrica S.A. (ISA) which, with a significant support from the World Bank, coordinated the electrification of the country, including the integration of the already existing plants (like Bajo Anchicayá y La Esmeralda) into the national grid, the interconnection of isolated grids (Bogotá, Medellín, Cali, Manizales, Bucaramanga, Barranquilla), and the construction of large projects like San Carlos, Chivor, Betania, Guatapé, Guavio, between 1970s and '90s (Álvarez, 2011).

In Indonesia, more hydropower dams were being built in the 1960s and 1970s under the direction of the dam-building agency National Electric Power Company (PLN), under Suharto's presidency. Initially, the New Order of the new president inherited five major projects from the Sukarno era: the French-financed Jatiluhur dam on the Ci (River) Tarum in West Java; the Selorejo

and Karangkates dams on the Brantas river system in East Java, and the Riam Kanan dam in South Kalimantan; and the large hydropower plant on the Asahan river in North Sumatra, comprising the Siguragura and Tangga dams, all financed with war reparation loans from Japan. The greatest number of Indonesia's large dams were built on Java and were mainly for irrigation purposes. More recent dams are instead designed for hydropower, and they include also plants outside Java. According to (Aditjondro, 1998), Indonesian media has portrayed the country as the number-one dam-building nation in Southeast Asia, and praised big hydropower projects for supposedly balancing regional disparities across the islands. Protests against dams in Indonesia have been recorded since the 1970s, for example against a USAID-funded dam on the Tandui River in West Java, which threatened the reserve of a species of monkey regarded as holy, and against the Riam Kanan hydroelectric dam in South Kalimantan in 1973, which submerged graveyards. Protests intensified during the 1980s and 1990s, according to the considerable review of press evidence by Aditjondro and Kowalewski (1994), and were mainly led by farmers who would receive poor compensation and poor resettlement conditions. The probably most publicized Indonesian dam dispute is the Kedungombo case, which saw the alliance of displaced farmers, student groups, and NGOs in confrontations with the government. According to (Aditjondro, 2002; 42-43), "the students' mass actions for and with the Kedungombo farmers became the point of departure between the younger and more radical activists and the older and more professional ones [...]. The non-student NGO movement had chosen not only to 'go public,' but also to 'go international.'" In fact, in April 1989, Indonesian activists joint an international coalition to petition to the World Bank against the human rights violations in the Bank-financed dam area.

In India, the first multi-purpose project was launched in the late 1940s in the Damodar Valley by the Damodar Valley Corporation (DVC)[7] on land belonging to West Bengal and Jharkhand, modeled on the Tennessee Valley Authority, just at the time of the proclamation of Independence (Act No. XIV of 1948). A complex of dams, barrages, generation plants, and other industrial infrastructure were pushed forward as a matter of national pride, an affirmation of India's technological autonomy and its capacity to 'catch up' with the West (EJAtlas 2014b). Names like Farakka, Maithon, Panchet were going to be remembered as the unfulfilled "harbinger of unforeseen prosperity in Eastern India", as in the words of Ashish Nandy (2001). However, after more than 50 years, many impacted families are yet to be compensated, while a large number of marginalized communities, especially adivasis, are not even recognized as affected.

Just like the DVC, another controversial plan was planned since the late 1940s along the Narmada river and its tributaries, across Madhya Pradesh and Gujarat, the Narmada Valley Development Project. Its story has marked the international debate around dams and hydropower, and has inspired movements in other parts of the world, as well as scholars, journalists and politicians in India and beyond. For its global relevance, we will introduce here an overview of the proposed project, the birth of the largest anti-dam movement of India, and its implications for the international dam industry and donors.

[7] The Damodar Valley Corporation is a special company in charge of carrying out a vast infrastructure plan in the valley, which included: four multi-purpose storage dams (Maithon, Tilaiya, Panchet, and Konar), two barrages (one of them the controversial structure at Farakka), a huge power station at Bokaro and a smaller one at Chandrapura, a well-known fertilizer factory at Sindri, and a few townships. By the time of writing, four dams have been built, while the others will probably not go ahead. Since its onset, DVC has been highly controversial and agitations continue even in recent years (EJAtlas 2014b).

2.2.1 The Narmada saga: the global relevance of the 'valley that refuses to die'

The Narmada Valley Development Project includes more than 3000 small barrages, 135 medium-size dams and 30 large ones (above 15m in height), including 6 huge dams, which are turning the river into many artificial lakes. The whole project is supposed to provide huge amount of hydroelectricity and water for irrigation to industrial plants, mining concessions, etc. to support the growing economy of India. What Prime Minister J. Nehru once called 'the temples of Modern India' have submerged the homes and livelihoods of hundreds of thousands of people, and sparked a large resistance movement, later named Narmada Bachao Andolan (NBA, Save the Narmada river Movement).

The NBA was initially built upon pre-existing organizations, including ARCH-Vahini and the Narmada Bachao-Nimad Bachao Sangharsh Samiti, and included a diversity of perspectives and positions with respect to the mobilization strategy. However, once it became clear that fair rehabilitation was not feasible, and that the government neither had clear procedures planned nor were they conducting the required impact assessments (Dwivedi, 1997), a new phase of the movement initiated. Activists, including key figures like Baba Amte and Medha Patkar, forged a radical environmental opposition to the dams, which later became the NBA, with the slogan *Dubenge per Hatenge Nahin!* ('We will drown but will not move!'). The movement first focused on one of the largest dams, the Sardar Sarovar Dam (SSD), but soon networked and built a much larger movement together with other oppositional groups along the valley, such as in the upstream area of Bargi, along the tributaries and, more importantly, in the Nimar region in Madhya Pradesh, where other large dams were either planned or already under construction. The NBA movement was initiated by 'outside' activists

(i.e. activists from and trained outside the valley), but was soon joined by representatives of diverse social groups (or *jati*) from the valley as well as Adivasi groups.

A large literature in India and elsewhere engaged with the history and politics of the NBA (Baviskar, 1995; Dwivedi, 1997; Fisher, 1995; Gadgil and Guha, 1993; Gandhi, 2003; Routledge, 2003) and contributed to the dissemination of its story globally. The SSD, in particular, became a transnational symbol of forced displacement. International NGOs, such as Friends of the Earth and Friends of Narmada, also contributed to spreading the story of the valley amongst an international audience, NBA activists entered the US Congress to voice the distress of the local people. Activists Medha Patkar and Baba Amte were awarded the Right Livelihood Award in 1991, and that same year the European Parliament finally passed a resolution to put pressure on the World Bank to withdraw its funds. The international momentum was so high that the bank had to appoint an Independent Review Mission to investigate the social and environmental impacts of the dam, unprecedented in the history of the biggest world finance institution. The final document was submitted to the World Bank on April 1, 1992 after extensive field visits by the mission's members including the former head of the UNDP, Bradford Morse, and Thomas Berger, who served as Special Counsel to the Attorney General of British Columbia, Canada (Berger, 1993; Morse and Berger, 1992). The Independent Review, also known as the Morse Report, defined the dam project as "flawed", and recommended a step back by the bank. The following year, the Indian government resigned from the loan contract and decided proceed with national resources.

The withdrawal of WB funds was registered as a huge victory for the movement, both in the Narmada valley and internationally. However, any dialogue with the state and central governments still looked very unlikely,

and attempts by NBA to negotiate on the rehabilitation packages found closed doors. This brought the movement to launch a new phase of resistance, under the slogan *Hamare Gaon Main, Hamare Raj* ("Our Rule in Our Village"). Awareness and resistance would have to be built day by day from the villages by enlarging the base of people's support and educating and engaging people from the villages in the struggle, including the younger generations (Chapter 6 of this thesis elaborates further on this).

Since then, the movement has mobilized in countless actions across the valley, including marches (rallies), pilgrimages across the valley and all the way to district headquarters and state capitals (*yatras*), massive demonstrations around police stations or officials' offices (*tana gherao*) in order to get obtain due information or responses to their petitions for fair rehabilitation, blockades of access roads to the villages for police or governmental officers (*rasta roko*), hunger strikes, and sit-ins (*dharna*). New forms of mobilization have been introduced such as sit-ins or stand-ins in rising waters, ready to drown in the case demands are not taken seriously by the government (*jal samarpan* o *jal satyagraha*). More NBA offices were opened in homes and offices in the villages, more activists joined the movement with full-time commitment, and the engagement in legal struggles increased, in local courts and up to the Supreme Court.

One of the most urgent and problematic issues to be tackled was the forced displacement and the consequent disruption of community bonds and loss of livelihoods. Throughout the following years, the movement demanded that the government should engage in a national policy for resettlement and rehabilitation, which should be "inclusive of just and fair, livelihood-based rehabilitation of the minimally affected people". After decades of struggle, in 2013 the government approved the Right to Fair Compensation, Transparency in Land Acquisition, Rehabilitation and Resettlement Act,

2013 (LARR), which replaced the colonial Land Acquisition Act, 1894. However, the act received multiple criticisms as it "doesn't protect land rights or deals regarding the historic injustices committed in the name of development and public purpose" [8]. According to the National Alliance of People's Movements (NAPM), the act particularly facilitates the acquisition of land for private interests, and under these terms it cannot reverse the "rapacious use" of the colonial law which left "100 million people [...] displaced from their land, livelihoods and shelters".

It's noteworthy that official figures on displacement due to dams and other land acquisitions are still not available. However, a 2015 fact finding report initiated by concerned experts, activists and scientists, estimated that, only for the Sardar Sarovar Dam, around 48,000 families are suffering displacement due to the submergence of 37,500 hectares of land, including more than 13,300 hectares of biodiverse forest. "But", warns the report, "the total number of displaced families will be much higher, as the over 90,000 kms of canal network will require over 100,000 hectares of land" (Central Fact Finding Team report, 2015).

The importance and global relevance of the Narmada struggles and the withdrawal of the World Bank from the Sardar Sarovar Dam is also related to the creation of the World Commission on Dams, which marked a watershed in dam financing in the early 1990s. The origin of the initiative lies undisputedly in the hundreds of local struggles against the destructive impacts of dams. In June 1994, as part of EJOs-led campaign for the World Bank's 50th anniversary, organizations such as the International Rivers Network (IRN) and the NBA released the Manibeli Declaration, in which one hundred and twenty-six groups from forty-four countries called for a

[8] All citations retrieved from the 2013 NAPM press release "NAPM commentary on the new Land Acquisition, Rehabilitation and Resettlement Act, 2013. Available at: http://sanhati.com/articles/8578/

moratorium on WB funding for dams and for the establishment of an independent comprehensive review of all funded projects. The principal idea was to inquire into the real environmental, economic, and social costs and benefits of dams, as no such study had yet been carried out, and thus far delegitimizing demands and concerns of opponents had been far easy for dam promoters. The World Bank could not ignore such demands, and opened the dialogue with the well-known International Union for Conservation of Nature (IUCN), relying on the possibility of allying with these 'resonable' environmentalists and thus marginalizing more progressive and confronting voices. However, probably thanks to some individuals in the big NGO, representatives of IRN and local activists could also enter negotiations with the WB and bring forward their demands (McCully, 2001b). Thanks to the previous positive results of the independent review on the SSD (i.e. sincere engaging with affected communities, rigorous findings, etc), the creation of an international independent commission to conduct a comprehensive review of dam projects started. Their proposal was finally accepted by the World Bank and the process for the establishment of the World Commission on Dams started. It was a challenging task, as it brought together both critical positions and pro-dam lobbies (McCully, 2001b).

In 2000 the WCD issued its famous report, Dams and Development: A Framework for Decision Making, and exposed many of the key concerns of dam opponents. This included the fast rate of dam building, the large financial scale of dam industry, high cost overruns, lower performance in terms of power generation, massive displacements, gas emissions, and other social and ecological impacts. The WCD report is still regarded as the most respectable comprehensive review of dams, despite its limitations in terms of data availability and progressive positioning, due to the inclusion of industry perspectives. According to McCully (2001b), "The WCD can be described as a globalized and privatized policy process. The public sector was, to a

significant extent, marginalized from the process, and much of its accustomed political space taken up by civil society and the private sector. It was in this case fortunate that civil society was better able to exploit this space than the dam industry." The WCD experience represents an eloquent example of the important role EJOs have played globally in shifting powers and political processes around the politics of dams.

Preceding the Narmada case and the mobilisations of the NBA, there had been a successful and inspiring anti-dam resistance in the South of India in the 1970s and '80s. In 1976, Kerala State Electricity Board planned the construction of a 240 MW hydroelectric project, the Silent Valley Hydro-Electric Project (SVHEP), over the Kunthipuzha River, which intended to submerge 8.3km^2 of forest land (EJAtlas, 2018a). This attracted the attention of environmentalists not only in Kerala state but all over the globe, concerned that the construction of the dam would submerge vast amounts of land and severely destroy the rich ecological flora and fauna of the region. Romulus Whitaker, founder of the Madras Snake Park and the Madras Crocodile Bank, was probably the first person to draw public attention to the small and remote area. The poet activist Sugathakumari also played an important role in the Silent Valley protest and her poem "Marathinu Stuthi" ("Ode to a Tree") became a symbol of the protest from the intellectual community and was the opening song/prayer of most of the "save the Silent Valley" campaign meetings. The protest from the Kerala state was further intensified as people from all over the country joined, and it soon became India's major and perhaps the first environmental movement (together with the Chipko movement) with a far reaching consequences. In 1983, a multidisciplinary committee, created to decide if the hydroelectric project was feasible without any significant ecological damage, submitted a negative report, after which the Prime Minister of India decided to abandon the project. On September 1,

1986 Silent Valley National Park was designated as the core area of the Nilgiri Biosphere Reserve.

2.3 The 1990s: the privatization in the dam industry

In the decade between the break up of the WB contract with the Indian government for the Sardar Sarovar Dam and the work of the World Commission on Dams (1990-2000), the public dam industry slowed down its pace globally, as public funders significantly reduced their commitment. However, many projects were being taken up by private actors, with governments opening up to the liberalization and privatization of the energy sector (Ahlers, 2010; Islar, 2012). These reforms have taken place against the backdrop of a much wider neoliberal paradigm shift from state ownership (and centralized organization of infrastructure industries) to private ownership, public regulation, and market competition. According to Jamasb (2006) "Between 1990 and 1999, private participation took place in the electricity sectors of over 75 developing countries and the total private investments amounted to approximately US$160.7 billion in 695 projects", especially in generation, and with significant regional differences. The East Asian and Pacific countries mostly opted for power purchase agreements (PPAs) with independent power producers (IPPs) in greenfield projects, while maintaining state-ownership of existing assets. Latin American countries engaged in privatization and opened the sector to IPPs.

However, multilateral and bilateral agencies are not necessarily as far out of the picture as this would imply. The World Bank and its regional branches (Asia Development Bank, Inter-American Development Bank, or the Africa Development Bank) extensively encouraged specific types of contracts that generally benefitted the private sector, such as Public Private Partnerships

(PPPs) and the Build-Operate-Transfer (BOT), which negotiated between power exporting countries, the host states and the independent power producers (see Table 2.1 below). According to scholarly and independent studies, these arrangements give investors a considerable degree of control over the project, while governments (i.e. the public money) absorb significant risk guarantees to secure satisfactory revenue flows to project developers. This makes PPPs and BOT contracts attractive to investors by privatizing the benefits and socializing the risks (Hildyard, 2016; Motta and Matthews, 2018). Apart from facilitating private benefits, lending has tended to go to the ancillary infrastructure that facilitates – and effectively subsidises – hydropower development. In particular, Hirsch (2010, p. 320) considers the involvement of the World Bank and ADB loans for high voltage power lines and the planning of a Mekong-wide regional electricity grid that "keep these institutions firmly within the arena". Another example is the ADB involvement in transmission infrastructure in the Indian Himalayas, as argued in Chapter Four of this thesis.

Table 2.1 Hydropower infrastructure types of contracts. Most frequent types of contract for infrastructure development and corresponding examples of hydroelectric projects. Note that no BOO (Build – Own – Operate) were found for dams, as their lifetime is limited

Type of contract	Acronym	Description	Features	Examples
Build Operate Transfer	BOT	Company builds and owns the dam for a given time, after which it hands it over to the local government.	Less risk of non-payment, profitable in the long run. Higher responsibilities and more power for companies. More space for negotiation.	**Kamchay dam**, Cambodia. Local government issued extension of the concession from 25 to 44 years and promised a bail out if power generation was under expected figures (Minimum Revenues Guarantee) (Tan-Mullins et al., 2018)
Build Own Operate	BOO	Private company retains the facility and any residual project value because the physical life of the project coincides with the concession period.	Very large investments and a long payback period.	-
Engineering Procurement and Construction (or Turnkey Contract)	EPC	National developer contracts a builder, which has responsability for overall construction	Lower financial risk. Higher cancellation risk. Common model for Chinese companies.	**Bui Dam**, Ghana. Funded by ExIm Bank and built by Sinohydro. After construction it was handed over to national government, who set up Bui Power Authority to operate and manage the dam and its impacts, incl. compensation (Tan-Mullins et al., 2018)
Public Private Partnership	PPP	Joint ownership of builder and host country's partners. Among PPPs, there are different types, like Take or Pay contacts through Purchase Power Agreements (PPA).	Shared risk, shared responsibilities among all parties. Preferred in politically stable countries. Important space for increasing benefits to private actors.	**Nam Theun 2 dam**, Laos (border region with Thailand). Thai state-owned EGAT was obliged to buy electricity at a higher price than other domestic sources from the generating company Nam Theun 2 Power Company Limited, a consortium of corporations with EDF (France) as Head Contractor. **Maheshwar dam**, India. A PPA between the State Electricty Board of Madhya Pradesh and private company S.Kumars (now MW Corp) bond the former to buy electricity at three times the market price, due to project cost overruns and political issues.

India and Brazil are two illustrative examples of the long term implications of the hydropower privatization of the 1990s. In the case of India, large-scale changes were initiated in 1991 with the liberalization and privatization of almost every aspect of the economy under the aegis of the P.V. Narsimha Rao's Congress government and the Finance Minister Manmohan Singh. This implied a significant change in the legal regime. The Industry Policy Resolution was amended in 1991 removing the energy sector from the list of activities reserved to the public sector (Dharmadhikary, 2009). In 1998 the government implemented a new Hydropower Policy and created the Central Electricity Regulatory Commission, which was supposed to be the key strategic institution to persuade private corporations to enter the Indian electricity business. Later, the Electricity Act 2003 introduced the provision of Open Access, which allowed generating companies to sell power to any distributing companies or even directly to consumers, rather than solely to the State Electricity Boards as before. With these provisions, a long series of incentives for private capital to enter the country were established. For example, the private sector was allowed to set up any kind of electricity generating plants (except nuclear) of any size, one hundred per-cent foreign equity was permitted, seventeen per-cent return on equity in the currency of subscription was guaranteed, and hydrological risk was to be borne by the government (i.e. public money), among others (Dharmadhikary, 2009).

Brazil approved a series of institutional changes, laws, decrees, regulations and reforms to the tariff policy in 1993. These allowed the privatization of utilities, permitted foreign investments and independent power producers, revised the role of the Eletrobras company, an independent transmission grid and a new electricity regulatory agency (ANEEL) were created. One of the radical changes introduced was the tariff policy, which now allows utilities to charge customers a price that reflects the cost of generation but that includes interest payments and other special costs such as those from

mandatory acquisition. In relation to hydropower, which in the 1990s already provided over 90% of total national supply, it also changed the definition of a small hydroelectric unit from less than 10 MW to less than 30 MW, thus making procedures for impact assessments and permissions much easier for an increasing the number of plants (Mendonça and Dahl, 1999).

2.4 The expansion of the hydropower extraction frontier

The year 2000 is considered as pivotal to the hydropower sector. Despite a decade of privatizations and the emergence of a strong conglomerate of private actors, the World Commission on Dams confirmed resoundingly that dams and hydropower plants bring about disastrous social and environmental impacts, and their performance is often lower than expected (WCD, 2000). For international agencies, donors and governments, it was not longer easy to justify greenfield projects or funding in this sector.

However, new actors were ready to take on this role in a market with new rules and old but renovated narratives supporting hydropower. These new actors include international investment funds, the Chinese government and state companies, and climate change finance. The narratives once again included universal access to electricity and economic cooperation for development, as well as a new stronger emphasis on sustainability and the renewability of hydropower in a scenario of transition to renewables.

The privatization process of the 1990s provided the basis for this increasing engagement of private actors in hydropower installation, including not only construction companies but also private investment funds such as pension funds, insurance funds, hedge funds, etc. This brought an even more complex configuration of actors, interests, instability, and imprevisibility into the construction sector, in what is sometimes referred to as a financialization

of infrastructures and energy (Bresnihan, 2016; Observatori del Deute en la Globalització, 2015; Tricarico and Sol, 2016). As explained in the previous section, Public Private Partnerships have largely supported the entry of this private capital into the hydro sector. However, to deal with the complexity of hydropower investments and with the associated risks especially during the planning and construction phases, institutions such as the International Finance Corporation (the branch of the World Bank for the private sector) or the private hand of the InterAmerican Development Bank (IADB Invest) are committed to carving out the commercial aspects of infrastructure in order to secure private investment[9]. As also highlighted in Chapter Four, the role of these institutions is to facilitate the investment of private actors, which means ensuring profit revenues and providing for risks and potential losses to be taken up by other actors (often the state).

We will describe the role of climate finance and the narratives supporting hydropower in more detail , after first exploring in the following section f the relevance of Chinese capital in financing overseas dams today.

2.4.1 China overseas dams undertaken

According to Siciliano and Urban (2018), between 50 and 60 percent of the world's dam market is currently dominated by Chinese companies, which account for a 81 percent of large projects, 15 percent medium size and only 4 percent small plants. Chinese dam projects are mainly located in Asia (57%), followed by Africa (26%), Latin America (8%) and Europe (7%) and the Middle East and Pacific have a one percent each. The Sinohydro company controls more than 40 percent of the total Chinese overseas dam market. We

[9] IFC for example has been involved in the Reventazon project in Costa Rica, a 305 MW station and today the largest hydropower plant in Central America. The project has been financed with an unprecedented bank-bond funding structure, i. e. a bond issued from the US market, IFC InfraVentures and the local utility, the Costa Rican Institute of Electricity (ICE). Tapping into capital markets, this is the first time bond holders have taken on construction risk for hydropower. The total project cost is estimated to be around USD 1,400 million. Once built, the project will generate around 1,400 GWh each year, providing about 10 per cent of the country's total electricity generation.

can consider this Chinese involvement in overseas endeavours to be motivated by multifold political and economic factors. First, there is a political and geopolitical component for increasing the nation's influence and its control of access to natural resources through securing infrastructure contracts through trade agreements and aid. Second, it is business oriented, since the saturation of suitable places for construction within the country has occurred and there is a lack of international competitors as Chinese companies incur much lower costs. We could perhaps add a third one, which is the aspiration of China to increase the share of electricity consumption coming from renewables sources in order to tackle dramatic domestic air pollution. The following sections unpack the essential elements of these three drivers, not forgetting the socio-metabolic context of such economic and political aspects, namely the overall global growth of energy production in all its forms.

China's engagement in the construction of dams overseas is part of the 'going-out strategy', which was first incorporated into the 2001-2005 Five-Year Plan, and encouraged under the 'One Belt, One Road' initiative launched by the Xi Jinping government in 2014. The country's interest in increasing its influence in the area is transversal across multiple economic sectors, with energy-related infrastructure as key asset. Moreover, following Motta and Matthews (2018:19), "China's overseas investments, trade and aid must be viewed as a package rather than separated initiatives." The cases of the Bui dam in Ghana or Kamchay dam in Cambodia are illustrative examples. In the first case, the agreement to build the hydroelectric plant came together with a trade agreement for cocoa exports to China (Odoom, 2017; EJAtlas, 2018b). In Cambodia, the dam was part of a $600 million aid package given by China in 2006, followed by a series of similar packages in the following years. The project has raised several concerns in relation to its governance, however, which points to the severe limits of the bundling of

aid, trade and investments. The Build-Operate-Transfer (BOT) contract for the dam granted a concession period of 44 years to Sinohydro, significantly longer than the usual concession period of 25 years. The construction started in 2007 and it was commissioned in 2011, but the EIA was not completed until July 2012 (Siciliano et al., 2016; EJAtlas, 2018c). Moreover, according to Middleton and Matthews (2014), the Cambodian parliament voted in favour of the contract, but claimed it had not yet seen the contract and expressed concerns over the long concession timeline. Another example of the bundling in relation to geo-strategical Chinese hydro investments and access to resources is the Merowe dam in Sudan, which supports oil extraction activities; it was funded together with other oil related infrastructures, such as pipelines, a railroad for industrial transportation and thermal plants, among others. Similar packages are implemented in Angola, Congo, Ethiopia and other African countries (McDonald et al., 2009).

According to research by Tan-Mullins et al (2017), another important driver for Chinese involvement in overseas hydropower can be located in pure market dynamics, such as the high competition between Chinese dam builders within China and the saturation of the domestic market, the competitive advantage in terms of prices, and the large expertise in the engineering and fabrication of components. At the beginning of 2000s, China was completing the Three Gorges Dam (constructed between 1992 and 2012, by the Three Gorges Corporation-TGC), which can be considered a turning point in China's dam building sector (personal communication by prof. Ajiang Chen of the Research Centre of Environment and Society, Hohai University, Nanjing, China). With the giant dam, Chinese companies and engineers acquired significant experience and became self-sufficient in virtually all dam components; foreign funds and contracts decreased significantly. In fact, while TGC first focused on large dams in the Yangtze basin, in the recent years the company has been actively looking for business

opportunities in overseas markets including in the Amazon. In the words of the company's Vice-General Manager, Bi Yaxiong, "the firm has gained competitive advantages in the construction, financing and operation of giant hydro plants, but the market was now reaching a saturation point. [...]"[10]. Thus, there was a corporate need to internationalize business in as yet unexploited territories. Completed projects by TGC include the Diamer Bhasha Dam in Pakistan (EJAtlas, 2014d), the Mong Ton Dam in Myanmar, and Nam Leuk Dam in Laos.

TGC, Sinohydro, China Yangtze Power Co. and others are increasingly committed to building a wide network of infrastructure providing electricity across China. With long-distance transmission technology maturing, dam developers are considering it more feasible to transmit power from the Russian Far East and Siberia to China. In 2001 the two countries signed the Treaty on Good-Neighborliness, Friendship and Cooperation, and energy generation was one of the cooperation chapters. In the long term, electricity demand in Northeastern and Northern China will be increasingly covered by Russian and Siberian rivers. In 2012, EuroSibEnergo, the largest independent power producer in Russia, and China Yangtze Power Co. (CYPC), the largest Chinese listed hydroelectricity producer, signed a Framework Agreement that provides for joint investment in a list of power plant construction projects in Eastern Siberia, including the conflictive Trans-Sibirskaya plant on the transboundary Amur river basin (EJAtlas, 2016k).

China has also expanded its infrastructure network in South East Asia in order to import electricity to the south of the country. Moreover, the Mekong Regional grid, a component of the Asia Development Bank's multilateral Greater Mekong Subregion program, includes several cross-border

[10] Interview to Reuters, 2014. Available here: https://af.reuters.com/article/energyOilNews/idAFL3N0T446420141114?sp=true

transmission lines (Magee, 2006), allowing China to acquire the generated electricity for the Southern provinces (McDonald et al. 2009). This is the case of Myanmar for example, and especially for the Salween and the Irrawaddy river basins. In 2013, on the Salween river, one of the few largely untouched and free flowing rivers in the world, the government announced that a total of six hydropower dams were approved: the Naung Khar, Mann Taung, Mong ton, Ywathit, Hatgyi and the Kunlong dams. Construction activities soon started for the Kunlong dam (EJAtlas, 2018d). Planned capacity amounts to 1,400 MW, with about 90% of the electricity planned to be sold to China through the China Southern Power Grid. The project had to be stopped in 2015 due to intense fighting between Burmese troops and Kokang armed forces. The Myitsone dam project on the Irrawaddy in northern Burma, conceived, financed and – so far partially – built by the state-owned Chinese Power Investment Corporation (CPI), is to take electricity across the border and help industrialize the Chinese province of Yunnan. At 152 meters high and with a potential capacity of 6,000 MW of electricity, the Myitsone is intended to be the largest of seven dams at the headwaters of the Irrawaddy River. If completed, it will be the 15th largest dam in the world. However, soon after work started in 2009, the project ran into trouble with the protest of locals and the high militarization of the region. Its fate at the moment remains uncertain (EJAtlas, 2014c).

Chinese investments in overseas dams are not limited to Asia and Africa, but are also present in Europe and Latin America. In Europe, they are limited to selected countries in Eastern Europe which still hold a considerable unexploited and economically viable hydropower potential (IHA, 2017). In Latin America, Chinese financing is attractive since it usually comes without the policy requirements imposed by Western lenders (Motta and Matthews, 2018), and the conditionality is more business-oriented. Access to natural resources for China is the geopolitical driver here too (Kirchherr and

Matthews, 2018). An illustrative example is TGC's involvement in the 8040 MW Sao Luiz de Tapajos HPP, which would not only provide electricity, but also reduce the cost of food exports from Brazil to China via the Tapajós-Teles Pires waterway (a case further developed in Chapter Six)

A last driver we wish to mention is China's announced strong measure to reduce carbon dioxide emissions and coal-related pollution that are introduced in the 13th Five-Year Plan. Among these, a significant improvement in energy efficiency. To meet its international targets, China will need to harness another 12 percent from hydropower (Motta and Matthews, 2018) within 2010. The majority of as yet untapped hydropower potential is in the west and south-west region of China, and in the Great Mekong Basin (Red, Mekong, Salween, Ayeyarwady –or Irrawaddy- rivers). China's coal extraction seems to be stabilising at the enormous amount of four billion tons per year.[11] If the government is truly committed to fulfilling its commitments to climate mitigation and simultaneously growing in terms of GDP and energy consumption, its involvement in hydropower expansion (as for natural gas extraction) will inevitably increase.

[11] See for example Demaria and Martínez Alier in The Ecologist: https://theecologist.org/2017/jul/25/special-report-china-has-plan-peak-coal-and-new-silk-road in China Dialogue: https://www.chinadialogue.net/blog/8724-Beyond-peak-coal-The-new-outlook-for-China-s-carbon-emissions/en

2.5 Renewables, sustainability, and the closing of the gaps

Renewables currently account for around 20 percent of global electricity production, and hydropower comprises 80 percent of this share (Zarfl et al., 2014). As we will demonstrate below, hydropower is growing alongside the growth of other sources of energy (all of them at different speeds). Hydropower is further being promoted as a key component of the energy mix of a supposed transition to renewables. In the words of the International Hydropower Association, "In 2016, hydropower development continued a steady growth trend, driven by a demand for reliable, clean and affordable power as countries seek to meet the carbon reduction goals set out in the Paris Agreement" (IHA, 2017). Despite its ecological and social problems, it is still deemed to be less impacting, and thus more sustainable, compared particularly to fossil fuels and nuclear power (IHA, 2017). Moreover, with a large part of the global population still disconnected from the electricity supply, securing the future energy demand and closing the electricity access gap has become one additional discourse underpinning the current promotion of renewables and hydropower (United Nations Development Programme, 2009, 2005).

The UN Secretary-General's "Sustainable Energy for All" (SE4ALL) scenario aims to double the global share of renewable energy, as described in "Doubling the Global Share of Renewable Energy: A Roadmap to 2030". More recently, the International Renewable Energy Agency (IRENA)'s global Renewable Energy Roadmap (REMAP 2030) required around 2200 GW of total hydropower capacity to achieve its targets. This assumes an additional 500 GW of hydropower capacity should be built, in addition to the IEA projections (IEA, 2017). To cope with the significant controversies and open concerns around hydropower globally, governments, international institutions and banks are strategically promoting a 'better hydro' (IHA,

2017) as a fundamental component of the future energy mix in an assumed transition scenario to renewables, arguing that there have been errors in the past, but that there is the possibility and capacity to 'improve' performance.

The sustainability of dams is also defended by international climate finance, increasingly criticized today for its lack of transparency and efficiency (Adaptation Watch, 2016). Over USD 80 billion of labelled green bonds were issued in 2016, nearly doubling the previous year (IHA, 2017). The Hydropower Sustainability Assessment Protocol (HSAP), promoted by a multi-stakeholder forum led by the International Hydropower Association, has become broadly recognized as the primary tool for evaluating sustainability performance. Yet, a large scholarly and activist literature provides evidence-based critiques of Clean Development Mechanism funding for Run-of-River (RoR) projects, and question their sustainability as a means of mitigation (Erlewein and Nüsser, 2011; Haya and Parekh, 2011; Pottinger, 2008), as well as the efficiency and capacity of the HSAP to address all contentious issues and to include all important actors (China, for example, has not signed the protocol yet).

New interest and investments have been registered to plants whose design and technology are deemed to have less environmental impacts. This is particularly the case of the RoR schemes. These often imply smaller plants, and sometimes do not require large water storage. They are said to allow water to continue running, not to affect fisheries and not to cause displacement. With such premises, they are promoted widely especially in areas of more recent exploitation, such as mountainous or hilly regions. The Andes, the Balkans, Turkey and South Caucasus, and especially the Himalayas are now the target of massive investment in this type of hydro infrastructure. However, these schemes require the construction of multiple plants and multiple captions and the tunnelling of water, in what can be

described as a bumper-to-bumper row of construction. The spatial implication of these dams in mountainous regions, and the problematic dimensions of (un)sustainability of this hydro technology is also problematized in Chapter Four of this thesis.

A vast literature addresses the severe environmental impacts dams generate at the local scale (Fearnside, 2016, 2004, 1999; Grumbine and Pandit, 2013; Sovacool and Bulan, 2013), as well as at regional and global scales (Syvitski, 2008), in relation to the fragmentation of rivers (Zarfl et al., 2014), and to the greenhouse gases emissions of large reservoirs (Fearnside and Pueyo, 2012). Even the geological sustainability of dams is problematic, as shown by occasional dam failures, possibly as a result of increased seismicity caused by the dams themselves.

Concerning social impacts assessments (SIAs) used to assess dam projects Kirchherr and Charles (2016) identify their limitations in properly grasping the complexity of dam impacts, particularly due to project reductionism and the limited spatial and temporal perspectives. For example, in relation to displacement, perhaps the most controversial social issue, for decades the main focus of attention was the resettlement process and the inevitable political implications (Cernea, 1997). Displacement however causes much more complex social distress, and plays out over broader spatial and temporal scales, as also illustrated in Chapter Five of this thesis.

Concerns also include the significant cost overruns that most hydropower plants experience. According to the widely cited study by Ansar et al. (2014), among infrastructure assets, large dams are second only to nuclear plants for cost overruns, reaching 96% of the cases with recorded important increase of costs. The authors warn about the implications for host countries, which have had to absorb a dramatic increase of external debt to finance megaprojects.

Authors like Zarfl et al. (2014) also express concerns over the implications of the projected increase in hydropower potential installation for the country, since they did not find evidence of it being an effective measure to close the gap in access to electricity, nor for the improvement in economic conditions.

A statement by the World Bank in 2015, pre-announcing a renovated engagement of the dam industry conglomerate in large-scale endeavours (see Chapter Five for more details), should therefore sound as an alarm bell to scholars and scientists, as it shows a dangerous lack of consideration of the lessons (un)learnt over the past decades and the large corresponding scientific literature. Such a turn is confirmed by the numerous large plants that have been recently completed or are currently under negotiation and construction, such as the Belo Monte dam in Brazil; El Bala in Bolivia; Hidroituango, Hidrosagamoso and El Quimbo en Colombia; the Grand Inga in Democratic Republic of Congo, the Gilgel Gibe 3 in Ethiopia, the large dams along the China-Pakistan Corridor, the cascade of dams in the Mekong, and in the Himalayas, among others.

The figures below show the current distribution of hydroelectric plants globally. Figure 2.1 shows the distribution of existing reservoirs and their capacity according to the GranD database. Despite this database also includes irrigation dams, it shows the current concentration of big water captures and the heaviest dammed countries, which include the United States, China, Spain, India, Brazil. Figure 2.2 shows the current distribution of planned and under-construction plants, according to the most recent and comprehensive review of dam projects to our knowledge (Zarfl et al., 2014). The authors estimate that currently at least 3,700 hydropower dams with installed capacity above 1MW are either planned or already under construction globally. Ninety-three per cent of this increase in production will be provided by 847 large dams with a capacity of more than 100 MW each. The figure

shows the current targeted regions for hydropower, which include the Amazon and La Plata basins in Brazil, the Andes, the Yangtze basin in China, the Balkans, several regions in Turkey, South East Asia, and the Himalayas.

In Brazil, installed hydropower potential is today more than 90,000 MW and contributes to around 66% of all electricity generated nationally (EPE, 2017). Of its still unexploited hydroelectric potential of around 160 GW, about 63% is located in the North, mainly in the Amazon and La Plata basin (Soito and Freitas, 2011).

The hydropower industry sees in the Andes a vast potential for hydro expansion throughout their length, from the Caribbean to the Patagonia (Susskind et al., 2014; Pérez-Rincón et al., 2018). Among other ecological distresses, scientists warned about a worring lack of strategic planning especially in the Andean Amazon, where regional connectivity is under severe threat (Finer and Jenkins, 2012).

China will probably still remain the global leader in domestic hydropower dam construction with a technically feasible potential of more than 1.8 million GWh per year (Zarfl et al., 2014).

In the Balkans, most of the existing hydropower plants were built before the breakup of Yugoslavia (Špirić, 2018). After a (political) standstill in energy planning and development, today all Western Balkan countries plan large investments in hydropower, also encouraged by EU policies such as the ‘Projects of Energy Community Interest', backed by the European Bank for Reconstruction and Development or the European Investment Bank, aimed at the export of electricity to Europe (Bankwatch, 2013).

Turkey is believed to have the largest technically feasible potential in Europe, with 216 TWh/yr in Europe, and also a financially feasible potential of 130 TWh/yr. Most of country's water potential lies in the southeast region (Euphrates and Tigris basin) with 28.5%, followed by the Black Sea region with 13.3% (Dursun and Gokcol, 2011). To meet the growing electricity demand of the Turkish economy, large and small hydropower are being promoted, including the controversial 7490 MW Southeastern Anatolian Project (GAP) on the Euphrates and Tigris basins, encompassing 22 dams, and 19 hydropower plants and irrigation schemes on an area extending over 1.79 million ha (EJAtlas, 2017n).

South East Asia is arguably the most active dam building region in the world, with over 370 projects currently being built, constructed or planned. Moreover, China has in the Mekong Region two of the six key 'One Belt One Road' corridors for the expanded outward investment in infrastructure, which will make the region strategically key for China for perhaps decades to come (Motta and Matthews, 2018).

The Himalayas are perhaps the last frontier of hydropower expansion within India, but a more recent commodity extraction frontier for countries like Nepal or Bhutan. The last free flowing rivers in India are being heavily dammed in the pursuit of increasing the share of renewables in the country, and also to bridge the electricity divide gap of the 'backward' mountain states and the more industrialized areas. As much as China does gain energy from Tibetan rivers, Indian companies and banks also invest in hydropower projects in their neighboring countries aiming to imported cheap electricity. Chapter Four of this thesis explores drivers in greater depth and implications of expansion of hydropower in one of the Indian Himalayan states.

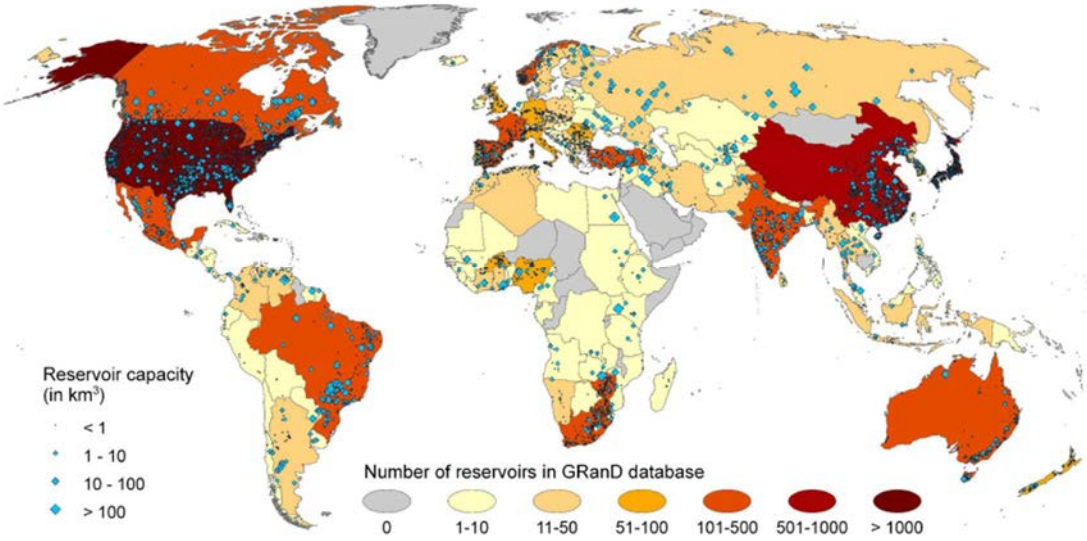

Figure 2.2 Global distribution (by country) of large reservoirs. Retrieved from Global Reservoir and Dam (GRanD) database

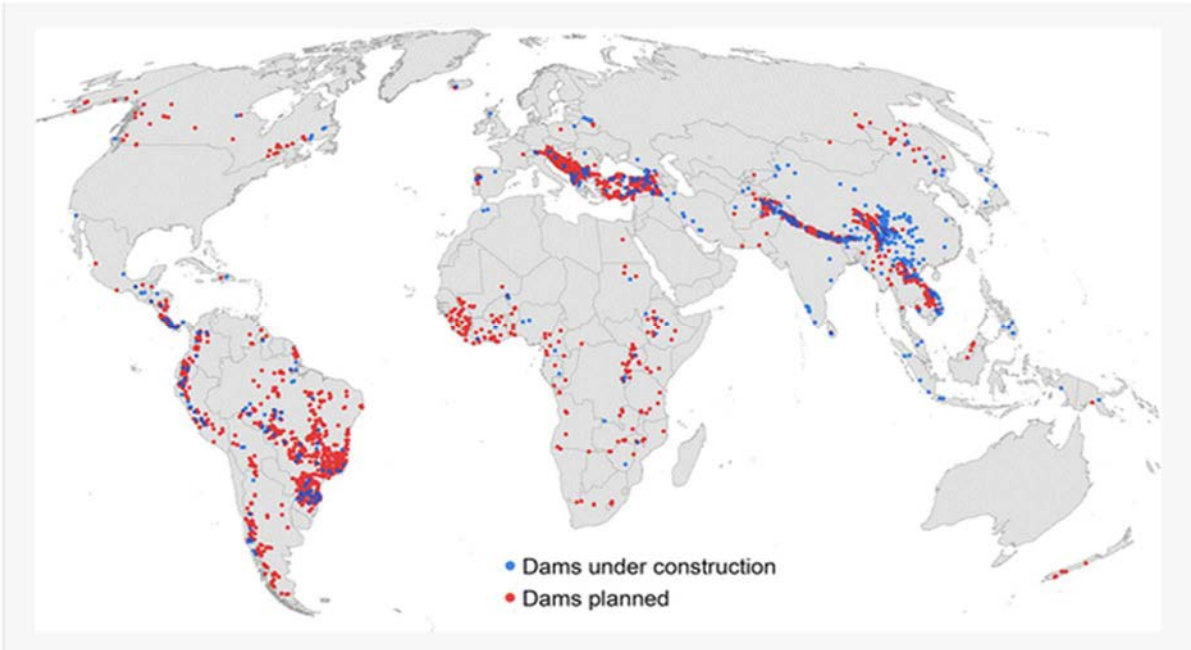

Figure 2.3 Global distribution of plants under construction (blue dots, 17 % of the total sample under study) or planned (red dots, 83 % of total sample). Source: Zarfl et al., 2014.

The consumption of hydropower has generally been growing worldwide since the decades of industrialization, but at different regional paces. Figure 2.3 shows a constant increase in Latin America and the Caribbean region since the 1970s, and an exponential growth in the Asia-Pacific region since 2003. According to the World Bank indicators[12], electricity production is expected to further grow by an additional 56 percent by 2040 (between 1993 and 2010 it already rose by 72 percent). Hydropower is supposed to take a significant share, in the so-called transition scenario to renewables (IHA, 2017). According to the World Bank indicators, electricity production is expected to further grow by an additional 56 percent by 2040, following a rise of 72 percent between 1993 and 2010. Hydropower is supposed to take a significant share in the so-called transition scenario to renewables (IHA, 2017). According to the International Commission on Large Dams (2011), the construction of the planned new dams can increase global hydropower production by 73 percent. In 2016 an estimated 31.5 GW of hydropower capacity was put into operation (including pumped storage), bringing the world's total installed capacity to 1,246 GW (IHA, 2017).

[12] World Bank data retrieved from online database available at: https://data.worldbank.org/indicator?tab=all

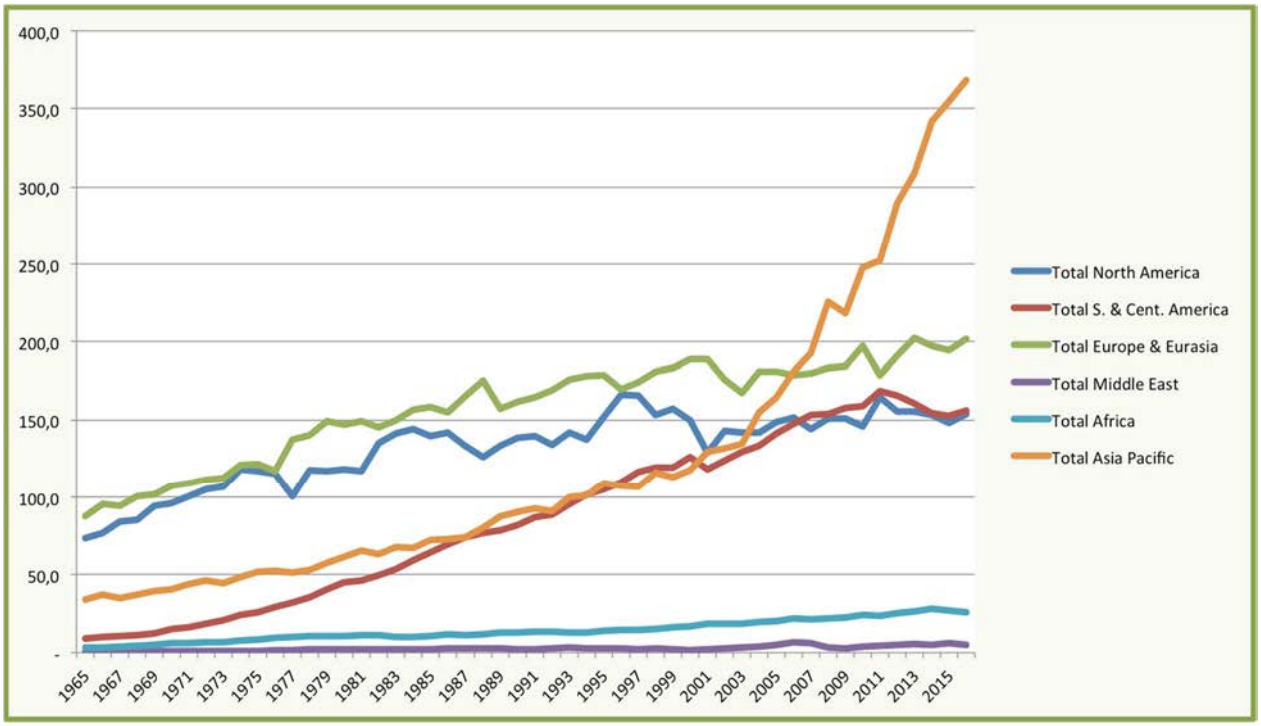

Figure 2.4 Regional trend in hydropower consumption from 1965 to 2016 in million tonnes oil equivalent (Mtoe). Own elaboration from BP Statistical Review of World Energy June 2017

However, as Figure 2.4 shows, the percentage of hydropower generation in the total share of the world energy portfolio has been declining, which suggests that despite all efforts to increase hydro installation other sources of energy are better addressing the growing energy demand (See also Zarfl et al., 2014). This means that, regardless of whether the pace of construction increases with the alleged objective to place hydropower as a key driver in the transition to renewable energies, it is actually not replacing other polluting sources of energy.

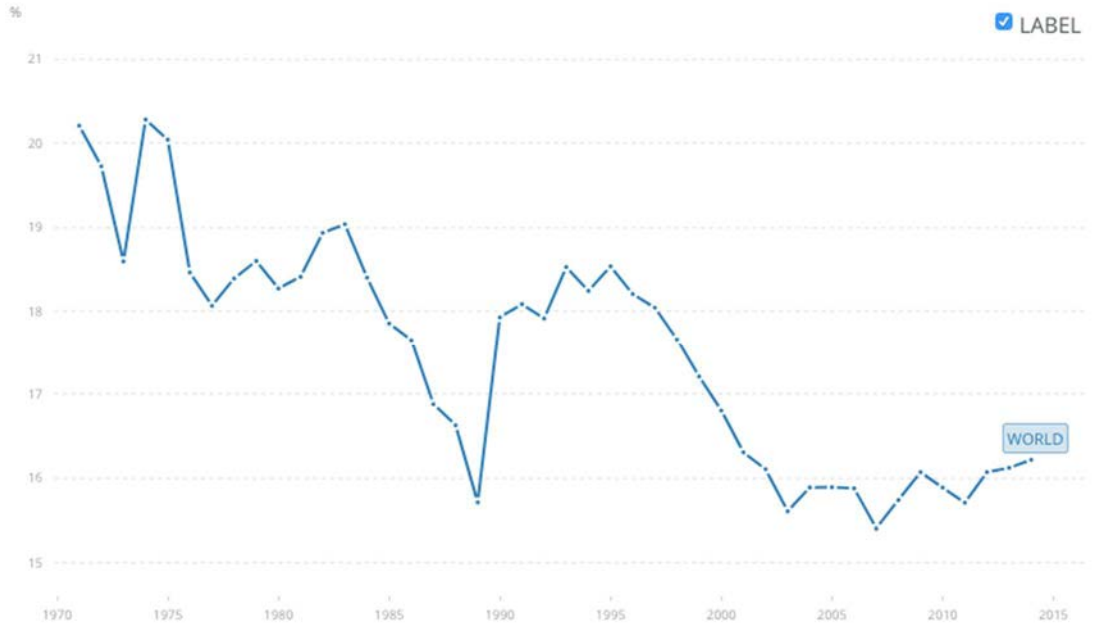

Figure 2.5 World electricity production from hydroelectric sources (% of total). Graph retrieved from the World Bank Data, 2018

Given the historical trend in the growth of consumption of different sources of energy globally, which continues today (Figure 2.5), the growing social metabolism of the global industrial economy (Martínez-Alier et al., 2010), and the incapacity of renewables to equal the production of electricity from fossil fuels (King and van den Bergh, 2018), there is an urgency in questioning what kind of transition we are actually hoping and working for.

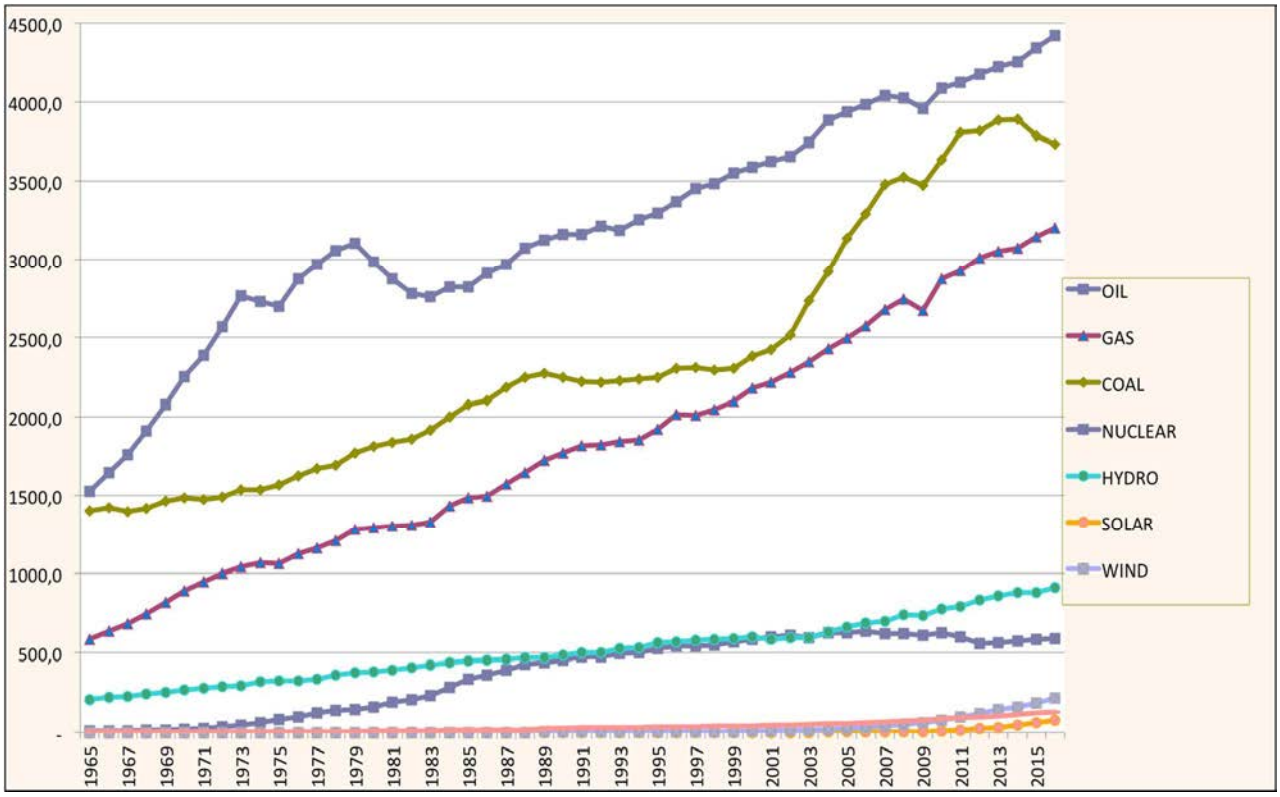

Figure 2.6 Increasing trends in consumption of sources of energy globally in million tonnes oil equivalent (Mtoe). Own elaboration from data retrieved from BP Statistical Review of World Energy June 2017

One last major issue we wish to point out here is the implications of the increased renewables development in terms of the further construction of transmission lines and interconnections. The idea of a 'global energy interconnection' (GEI) is being increasingly promoted by international actors and finance institutions as a necessary infrastructure network for an alleged transition to renewables (IHA, 2017) On March 29th, 2018, the first session of the first council meeting of Global Energy Interconnection Development and Cooperation Organization (referred to as GEIDCO) was held in Beijing. GEIDCO [13] is an international organization among willing firms, associations, institutions and individuals, whose main purpose is, according to its website, "to promote the establishment of a GEI system, to meet the global demand for electricity in a clean and green way, to implement the

[13] http://www.geidco.org

United Nations “Sustainable Energy for All” [...] This will help address power shortage and poverty, and will narrow regional gap and difference. Life will be better as the world gradually turn into a bright, peaceful and harmonious global village with sufficient energy, blue sky and green land.” According to the organization, three main deadlines have been set for the development of the interconnection infrastructure: 1. Domestic: Up to 2020, countries will focus on their own clean energy development and grid interconnection projects. 2. Intracontinental: By 2030, large scale energy bases and cross-border grid interconnections will be promoted within each continent. 3. Intercontinental: By 2050, energy bases of the Arctic and equatorial regions and intercontinental interconnections will be set up. According to GEIDCO, in this way the global energy interconnection will come into being (See Figure 2.6). Given the highly contentious ground for the land acquisition as well as for the ecological and social impacts of the building of transmission lines and related infrastructure, closer attention should be paid to how the expansion of renewables or of a global transition to low-carbon economy is being promoted and implemented by these sectors of the world economy.

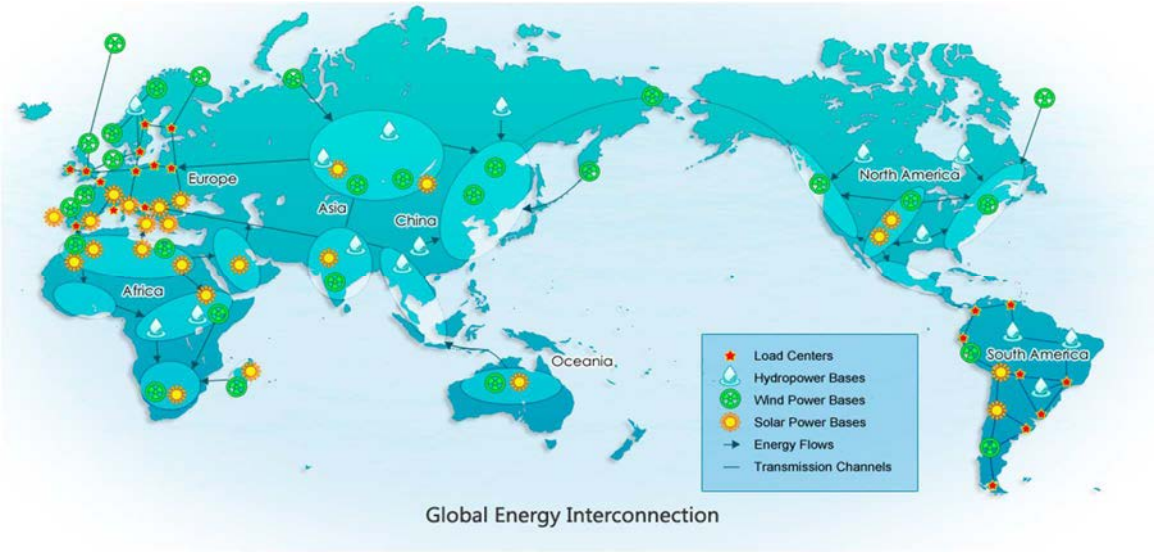

Figure 2.7 The global (renewable) energy interconnection according to GEIDCO. Retrieved from geidco.org

Some of the high priority transnational transmission infrastructures are already under construction. These include: a) the Manitoba – Minnesota Great Northern Transmission Line (500kV) which will deliver electricity generated by hydropower plants across the Canada-US border to the Iron Range substation near Grand Rapids, Minnesota. b) Belo-Monte to Rio de Janeiro and Sao Paulo, led by the State Grid Corporation of China and expected to be finalized by end of 2019. c) Quinghai/Ningxia/Shanxi to Shanghai and Guangdong province by State Grid Corporation of China. d) Europe North Sea Link (NSL) will connect UK and Norway with a 720km cable and enable a two-way flow of wind power and hydropower. e) Africa Clean Energy Corridor across the continent with multiple high voltage transmission lines. f) Multiple transmission lines in India, including Himachal Pradesh to Nagpur, Assam to Agra and Odisha to Bangalore.

2.6 Conclusions

This chapter provides an historical overview of industrial hydropower development across the globe. It demonstrates how it significantly expanded, starting from the 1950s and 1960s and then, after a modest lull in the public sector in the 1990s and 2000s, it is today undergoing a new boom in construction worldwide.

Yet the construction of hydropower dams at industrial scale has met with protests and opposition by local communities on account of the broad social and ecological impacts, and the way projects have been forcibly imposed. Such opposition brought communities, experts, and urban activists to mobilize and organize. The examples from the Narmada valley and from Brazil are illustrative of the historical questioning of mega dams for energy generation, and of the intended use of this energy, and at what cost. The chapter includes a brief history of the creation of the World Commission on Dams as one of the most contentious but also incisive documents on the impacts of dams globally, co-produced by technical experts, policy makers, and representatives of affected communities and environmental organizations.

After a lull in hydropower investment by big funders and institutions, the supposed sustainability and renewability of hydropower energy is today underpinning an important growth in the sector globally, and especially in the Amazon and La Plata basins in Brazil, the Andes, the Yangtze basin in China, the Balkans, Turkey, South East Asia, and the Himalayas. With the increasing participation of Chinese investors and global investment funds,

the support from international finance institutions and climate finance, hydropower has again become an attractive sector.

However, this is only possible if the costs of social and ecological impacts are externalized and not accounted for, and people's protests and demands diminished. Secondly, the declining proportion of hydropower generation in the total share of world energy portfolio raises the question of whether hydropower is supposed to lead a transition from fossil fuels to renewables, or whether it is going to be merely an additional source for the increased amount of energy required by the world's growing economy? Third, hydropower dams both large and small are currently conceived under the same logic of capitalist maximization of energy production for a global market in a growing economy, despite biophysical constraints and social distress. In any scenario of energy transition, therefore, not only the fossil fuels but also renewables and all their related infrastructures, including transmission lines and their territorial implications and impacts, would need to be questioned. Specifically, issues of scale, final use of energy, ownership, and governance should be considered and problematized, beyond the technological dimension of renewability of energy sources.

"Con este metodo de la participación
[investigación-acción],
no tendremos todas las respuestas
pero por lo menos estamos tratando de buscarlas,
y como en todo proceso cientifico honesto
será una busqueda eterna, indefinida,
donde siempre habrá campo para la critica,
para la observación y el enriquesimiento"

Orlando Fals-Borda[14]

[14] Abstract from: https://www.youtube.com/watch?v=op6qVGOGinU

3. Methods

This thesis is based on collective reflections upon the politics and discourses of anti-dam resistance movements in multiple locations and countries for at least the last ten years. It is the result of activist-scholar work, which actually started before my official registration in the Phd Program, with activist collectives in Europe and in international networks. During the years of the doctorate (2013-2018), I have then been able to build on this knowledge, and engage with theoretical fundations, especially in Environmental Justice and Political Ecology.

Each chapter provides a detailed explanation of data collection and analysis, which I will not repeat here. Here below I recollect and put emphasis on three major sites and spaces of research, which provide the basis for knowledge co-production on resistances and transformation processes around dam conflicts, namely fieldwork in India, international activists gatherings in Brazil and in Georgia.

I visited several regions of India since 2007 for my BA and MA dissertations (the Narmada valley in Madhya Pradesh and the Bhagirathi valley in Uttarakhand), and I returned three times after the registration in the doctorate program, summing up about one year and a half. In my last visits I expanded my area of research in the more recent areas of hydropower development, namely the Himalayan range and Himachal Pradesh. I visited and stayed with representatives of resistance movements and research collectives (like the Narmada Bachao Andolan in Madhya Pradesh and in Delhi, and Himdhara in Himachal Pradesh). This is the basis for the next chapter on the expansion of the hydropower commodity extraction frontier in Himachal Pradesh.

During my campaigning activist work in Europe I learnt about conflicts and resistances against dams financed or built by European companies in Latin America. Joint actions in Europe with activists and researchers from movements in the affected territories were the basis for trustful relationships of collaboration. I visited then Bolivia, Chile, and Mexico, where I took part in public events and thematic meetings and workshops with movements and researchers. Thanks to this web of relations and collaborations, during my doctorate I was invited to participate to a meeting of Latin American resistance movements against dams and the launch of the pan-Latin American *Movimiento Anti Represas* (MAR), happening in Chapecó, Brazil, alongside the academic conference 'IV Meeting on Social Sciences and Dams', in the Universidade Federal da Fronteira Sul (UFFS). I presented my work on India at the conference (I submitted a working article based on Chapter Four of this thesis), but I could also engage in discussions on dam affections, strategies of the hydropower industry, repression and collective construction of alternative visions and energy models with researchers and activists.

Thanks to this expanding network of contacts and trust, in 2017 I was able to participate to an international meeting of activists conveyed by the organization International Rivers in Tbilisi, Georgia. With around 100 representatives of about 30 countries, we discussed the international political conjuncture in relation to dams development, large renewables expansions, state-of-the-art of studies on impacts, displacements, alternative proposals and policies. This was a converging space for diverse political positions and strategies, which allowed me to discern commonalities but also divergencies, especially in terms of resistance strategies, which are unavoidably embedded in the diverse political contexts of each country.

Building on the knowledge of dam conflicts and through collaboration with a wide web of movements and researchers on the topic across the world, I contributed to the population of the EJAtlas, the Global Atlas of Environmental Justice with cases on dams, renewable energy and water management (more below). During the years of the doctorate (2013-2018), I've also been working as main coordinator and moderator of the EJAtlas, which has allowed me to see the multiple connections of dams with other type of conflicts, such as mining, plantations or water infrastructure building. This thesis, especially in Chapter 6, tries to expose such connections beyond the commodity-based categorisations usually applied in social metabolism and ecological economics studies.

As previously said, each of the three central chapters explains the type of data analysed and the process of collection in detail. In sum, Chapter Four is based on collaboration with an environmental justice organization, Himdhara, which mostly works at regional level in the Himalayan state of Himachal Pradesh, but in constant articulation with other regional and national organised collectives in India. We combined ethnographic data and fieldwork and comparative analysis across 17 cases of conflicts in the state. We co-produced a regional map of ecological conflicts in Himachal Pradesh and used the EJAtlas as both theoretical and technical platform to organise data and make it public. The featured map is published in the EJAtlas web page, and was also featured in online blogs and newspapers in India[15]. The final chapter and map are an example of the use and engagement of the EJAtlas for mapping, organising data and comparing cases of conflicts in a

[15] EJAtlas webpage: http://ejatlas.org/featured/himachal_pradesh
Online newspapers and blogs include the EJOLT blog (http://www.ejolt.org/2016/01/mapping-hydro-schizophrenia-peoples-resistance-indian-himalaya/), Himdhara website(http://www.himdhara.org/2016/01/21/mapping-environmental-conflicts-in-himachal-pradesh/) and Report (Dried & Dusted State of the Rivers Report – Himachal Pradesh, available at: https://counterview1.files.wordpress.com/2018/03/state-of-the-rivers-report-final-2017-himachal-pradesh.pdf), Business Standard (http://www.business-standard.com/article/news-ians/concern-expressed-over-india-s-hydro-power-plans-116030700604_1.html), Montgabay India (https://news.mongabay.com/2016/02/india-has-most-cases-of-social-and-environmental-conflict-according-to-environmental-justice-atlas/)

collaborative way among scholar researchers, environmental justice organizations and local 'grounded' communities. The publication of the resulting map in several blogs and online newspapers also show the potential of the EJAtlas as a tool for dissemination of research results, beyond purely academic outputs. For this project, I was awarded a travel and research grant by the Fundació Autónoma Solidaria[16]. This chapter is also turned into an article, co-authored with a local independent researcher and member of Himdhara collective. It is currently under a review process in the journal Water Alternatives.

Chapter Five is the result of the analysis of a database of 220 dam conflicts, built over about four years. Data came from grounded knowledge of local movements, well-known organizations and also peer researchers. I personally contributed to the data collection for about fifty cases. The chapter presents one of the first analysis carried out based on the EJAtlas database at global scale. It aims to contribute to a *comparative* political ecology, able to go beyond single in depth case studies, but without losing much robustness and accuracy of data. It is a statistical type of analysis supported by illustrative examples and backed by a cross checked database by the same authors. The chapter is also turned into an article, published in the Special Issue "The Global Environmental Justice Atlas (EJAtlas): ecological distribution conflicts as forces for sustainability" with twelve other articles in Sustainability Science (Del Bene et al., 2018; see also the editorial Temper et al., 2018a).

Chapter Six collects data, interviews, and testimonies from various fieldworks. It holds an ethnographic approach and, compared to the previous

16 News published in the UAB page. http://www.uab.cat/web/actualitat/noticies/detall-de-la-noticia-1260363248726.html?noticiaid=1345697629245

chapters, it gives more space to interviewees to express themselves in their own idioms and concepts. For this chapter, I used predominantly empirical material and conclusions of collective reasonings and reflections. Interviews here can be rather defined as *conversations*, where terms, language, concepts are fruit of the *encounter* between the researcher and the 'interviewee', in a dialectic manner (de Sousa Santos and Cusicanqui, 2015).

3.1 Co-production of knowledge: implication, potential, and limitation

This is not a work *on* anti-dam movements, but rather *with* them. During my research, I have tried to 'make experience' of movements as spaces for action and reconstruction; *sentipensar* with their members by sharing spaces, homes, experiences, emotions (Fals-Borda, 2005; Escobar, 2014); learn and research collectively about dynamics and processes of oppression and dispossession. I have myself been part of movements, and for this reason I consider this thesis work as inherently 'hybrid', as it tries to engage with established literature and meanwhile to bring a pro-active and critical approach to the research process. My methodological approach followed what Fuller and Kitchin (2004, p. 4) would call 'activist-led research', where "the role of the academic [...] is not simply as expert but as primarily as enabler or facilitator, and the role of the participants is one of co-researcher or co-activist".

This is not necessarily to say that activist research is 'better' or morally superior than that conducted at a physical or emotional distance but rather that the two are able to cover and unpack different (and potentially complementary) issues. Environmental justice and political ecology

literatures have usually referred to the concept of 'co-production of knowledge' for stressing the collaboration between the academy and activism (Temper and Del Bene, 2016; Delgado Ramos, 2017). The intention of co-production of knowledge in this thesis is not only aimed at data generation but also at the overall framing of the problem. What is the novelty in dam conflicts today? How is the problem being framed from a resistance perspective? How is it discussed from within the resistance? What dimension of the conflict is prioritized in a transformation perspective? These were the guiding questions at the time of designing and framing my research.

Co-production, or co-generation and co-construction, is not intended here as a useful *tool* to investigate uncertain, complex and urgent issues such as environmental conflicts, but rather as a precondition to ensure the quality of such process. Scientists and scholars are also part of a society that faces uncertainty, complexity, and urgency to tackle social and environmental crisis (Funtowicz and Ravetz, 1994). Their challenge should be therefore not much about deciding whether or not to engage with co-production, but rather *how* to do so, how to formulate what research questions, how to design their research, and how to publicize their results. Co-generation of knowledge is therefore about "enriching the path towards grounded languages with scientific work as an ally and not as a rival" (Ungar and Strand, 2005; my own translation).

Acknowledgement of the centrality of the dialogue between ways of knowing (*diálogo de saberes*) (Leff, 2004) and of the extended peer community in co-production is expressed in this thesis through three main components: 1. The EJAtlas as such, an expression of extended expert community on environmental justice and counter-mapping (the next section elaborates more on the first point). 2. The design of the research, namely the choice of fieldwork, research questions, timeline, etc. 3. The publication of results. In

the next paragraph, major potentials and limitations of these components are highlighted.

Co-generation of knowledge is not something immediate and easy to concretize. It has to have a strong trust base, which usually takes long time (it could be years, which is usually unrealistic for a Phd candidate). In my case, I could rely on previous solid relationships of trust, and also on the consolidated collaborations with EJOs partners in the EJOLT (2011-2015), ACKnowl-EJ (2016-2019) and ENVJUSTICE (2016-2021) projects. Co-generation of knowledge definitely exposes all researchers (understood here as both scholars and activists/community members, since all are researchers with different skills and languages) to a much wider range of topics and perspectives for analysis. However, it also ties the individual to a collective research project, thus the main questions also have to be discussed collectively. In the case of a Phd researcher, what initially could have been a personal voyage turns into a shared project where agreements are made and have to be mutually respected. Exceptions and changes of course can be there, but they also have to be discussed and agreed upon. In my case, the EJAtlas mapping project and the specific focus on the transformative proposals of movements were two important lines of research where I found shared interest in basically all fronts of resistance I have been at.

As regards fieldwork, researchers external to a specific community or movement cannot come and leave at their own choice, but have to come to a consensus upon timing, methodology and access, the specific focus; in some cases, they might have to restructure and reformulate their work. For example, field visits and meetings in rural contexts during harvest season should consider the fact that farmers have less time and energy to engage with the researcher. The academic calendar has to adapt to the ecological and social calendar, which sometimes represent a challenge for researchers.

Then, the issue of accessibility to specific spaces is particularly important. As an activist-researcher and even more as a foreigner, it might be delicate or not possible to participate to all meetings or to visit all areas of interest. In my case, I myself could not go to some affected areas (both in India and in Brazil) in order not to attract attention and not to expose the organization I was collaborating with to accusations of being manipulated by foreign interests. In those cases, I had to rely on co-researchers, with whom I had previously discussed and agreed upon aims, concepts, and methodologies. Trust, clarity on the framing and on the specific focus therefore become key preconditions for activist collaborative research.

Publication, dissemination and sharing of the results are other key components of co-production. The EJAtlas is designed as a public platform where individual cases are published soon after their moderation. Being of free access, their content is usually read by an 'extended peer readership' who often comments and sends feedbacks. Also, a comment function was added three years ago to facilitate feedbacks and encourage exchanges and sharing of information and opinions. During the preparation of the chapters included in this thesis, I received several comments to published cases, usually containing constructive contributions, but sometimes also pointing out missing information. Despite their initial complaining tone, they were useful for having exhaustive data sheets. All databases inevitably have loopholes and lacuna, however a good way to reduce the margin of error is to open them up for feedbacks to concerned communities, organisations, etc. Another challenge is the accessibility of publications and the type of language used. Academic articles are one format, especially relevant for the academic community, but sometimes are of restricted access. To reach out to an extended audience, results can also be turned into other types of publication. The featured map of Himachal Pradesh and the explanatory text that accompanies it is an example. Then, results presented in Chapter Five

will be included and discussed in a blog (currently under progress) for an online magazine. Next, some of the results presented in Chapter Six are included in two collaborative books. The first one was originally published by Icaria Editorial in Catalan with the Xarxa per la Sobiranía Energética and now also translated into Spanish and English (XSE, 2018). It is mostly distributed among activist networks with the objective to share the political positioning and analysis of the XSE and to find new allies with whom to articulate political action. The second one, edited by Alberto Acosta, Ashish Kothari, Arturo Escobar, Ariel Saleh and Federico Demaria, includes a chapter on energy sovereignty, which I co-authored with Colombian activists Juan Pablo Soler (Ríos Vivos) and Tatiana Roa Avendaño (Censat-Agua Viva) (Del Bene et al., 2018b).

Figure 3.1: Activist-research meetings with anti-dam networks and movements in Bilbao (Spain) in 2013 (on the left) and in Tbilisi (Georgia) in 2017 (on the right).

3.2 The EJAtlas: a hybrid co-produced database

The EJAtlas constitutes, to our knowledge, the largest existing inventory documenting ecological struggles from all over the world. In five years, we have collected data of 2500+ cases (as of July 2018). Conflicts over dams are about thirteen per-cent of the total. It is an ongoing process, with an average of one case added per day. It documents resistance across the chains of

accumulation, from extractivism to toxic pollution, territorial defense by peasants and indigenous communities against dams mines, coercive conservation projects and deforestation, protests of urban and rural dwellers against mega-projects, military and energy infrastructure and gentrification as well as conflicts over waste disposal such as opposition to landfills, incinerators, also climate justice movements and opponents of false solutions such as geo-engineering.

The EJAtlas has been informed, based on and co-designed together with global environmental justice organizations since 2011. Some of these organisations had been building their own repositories of knowledge on ecological conflicts for many years already, in some cases over the past 30 years. These include the Observatory of Mining Conflicts of Latin America (OCMAL), Oilwatch, the Centro di Documentazione sui Conflitti Ambientali (CDCA), World Rainforest Movement, FIOCRUZ, among others.

Within the aegis of the EJOLT project (Environmental Justice Organizations Liabilities and Trade, 2011-2015), the EJAtlas was thus conceived as a way to integrate this activist knowledge into a global platform that could serve as a tool for activism, advocacy, public education, and comparative analysis. The atlas thus aimed to systematize and to distill within a concise and codified structure these stories of struggle. Nevertheless, it also acknowledges the limited range of spatial and narrative illustrations to express the struggles, desires and values of the communities within such format (for a discussion of co-design and co-production of knowledge, see Temper and Del Bene 2016). At the same time, the EJAtlas aimed to transcend the "case study based approach" of most political ecology and EJ literature and expand research to identify patterns, relationships among multiple cases and actors and describe how such conflicts are shaped by the larger political economy.

The EJAtlas is a hybrid research project in that beyond the scientific aims, it also hopes to: 1) serve as a tool for activism and advocacy; 2) help visibilize and denounce cases of environmental injustice; 3) encourage dialogue and the interchange of experiences, ideas, data, and strategies of actions; 4) help network between movements and strengthen strategies of international articulation on EJ, and 5) contribute to new processes of knowledge creation within an EJ perspective (Temper et al 2015).

In this way, we can say that a further aim of the EJAtlas is to support and contribute to the cohesiveness and self-awareness of an emerging global and globalizing movement for environmental justice (Sikor and Newell, 2014; Martínez-Alier et al 2016).

Figure 3.2: Screenshot of the São Luiz do Tapajós dam case on the EJAtlas

"Why don't you want to go to school?"

"I don't want to go to those schools where you only learn about development and economic growth,
hierarchy, duties, patriarchy, war.
Do you know why they make wars?
Because they want energy and resources.
Here, I learn by myself what I feel like, I learn about sharing and caring, and then about the plants I find around, the trees wehn they bloom, the rivers flowing here.
This is education"

My nine-year old guest in Palampur, my best teacher on fieldwork

4. Extractivism of Renewables? Conflicts and resistance at a hydropower extraction frontier

Abstract

Hydroelectricity is promoted as a low-carbon, sustainable solution to meet the globally increasing power demand. However, as hydro infrastructures are expanding along new extraction frontiers globally, its impacts are increasing, environmentally and socially.

This article analyses the hydropower infrastructure expansion in the Indian state of Himachal Pradesh, which aims to exploit a potential of 27,000MW from both small and large plants. Our analysis is based on an activist-academic co-produced mapping of 17 cases of opposition to hydropower and on the languages of valuation deployed.

We first show how new commodity extraction frontiers of renewable energies are being produced in the Indian Himalayas. Second, we inquire into valuation languages Himachali people deploy to oppose hydropower projects. Third, we discuss the concept of extractivism to analyse the implications of the expansion of large-scale renewable projects. We suggest that forms of 'renewables extractivism' exist and rely globally on a 'consensus of (energy) infrastructures', in parallel to the concept of 'consensus of commodities' developed in the Latin American context.

Keywords

Hydropower, Renewables extractivism, commodity extraction frontier, Himalayas, Himachal Pradesh, socio-environmental conflicts, infrastructure

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4.1 Introduction

"Himachal Pradesh's focus on hydropower development will provide jobs to residents and further the state's and the country's goal of maximizing this clean, indigenous energy source to help meet its energy needs"

(Deputy Country Director of ADB's India Resident Mission[17])

"This program not only benefits Himachal Pradesh by supplying affordable, reliable power to its residents, but will enable the export of excess power to the rest of the country for the benefit of power-deficient states"

(Joint Secretary, Department of Economic Affairs, Ministry of Finance[18])

With the words above, the Asian Development Bank (ADB) and the Government of India (GoI) signed in 2012 the forth and final leg of an $800 million financing facility called the Himachal Pradesh Clean Energy Development Investment Program[19] aimed at expanding the supply of power

[17] https://www.adb.org/news/315-million-adb-loan-himachal-pradesh-hydropower-plant-signed. Last accessed: 23.02.18

[18] ibid.

[19] For more info: https://www.adb.org/projects/41627-053/main#project-overview Last accessed 08.03.018

in the hill state, in the Western Indian Himalayas. Better electricity supply will, according to ADB and GoI, help businesses, contributing to job creation and poverty reduction. An increasing interest in hydropower expansion in the Himalayas is furthermore justified in addressing climate, social, and environmental concerns through the generation of renewable energy (GoHP, 2012).

Across the mountain range, and including neighboring countries of Nepal, Bhutan, Pakistan and also China, international donors, banks, as well as private funds have enthusiastically reinvigorated their support for hydropower. Efforts for mapping renewable energy potential are being increasingly encouraged by the World Bank and the International Renewable Energy Agency, among others, with the intention of attracting investments and maximising the exploitation of land otherwise considered "marginal" (McCarthy and Thatcher, 2017).

All these actors are now consolidating a common ground for consensus around large renewable energy schemes in order to meet international obligations to reduce carbon emissions and to pursue national economic growth. The lull that affected the sector in the 1990's due to the severe socio-environmental impacts and people's resistance seems to be overcome (WCD 2000).

However, renewable energy does not necessarily mean less ecological and social impact compared to fossil fuels (Gibson et al., 2017). Hydro dams require large infrastructures, land acquisition and substantial use of construction materials. Consequently, there is an increasing pressure upon local ecologies and on the sources of livelihood along what can be considered new commodity extraction frontiers of renewable energy (Moore, 2000).

Such pressure and distress are currently leading to a mounting number of social environmental conflicts (Schlosberg, 2004). If this is generally acknowledged in relation to fossil fuels extraction or mining (Conde and Kallis, 2012; Walter and Urkidi, 2015), there is less awareness of similar dynamics in those areas targeted for the expansion of renewable energies, and therefore in relation to electricity and water. According to Scheidel and Sorman (2012), for example, renewables are more spatially extensive than fossil fuels due to their lower power densities, potentially leading to the diversion of more surface land area to produce a given amount of power. Land and water grabbing can therefore become a serious issue in the expansion of renewables (Franco et al. 2014; Avila-Calero, 2018).

Also, despite a widespread optimism contending that renewables have the potential to meet projected global energy demands (Jacobson and Delucchi, 2011; Delucchi and Jacobson, 2011), great concerns remain on the nature of such an energy scenario (Hildyard et al., 2012; Bridge et al., 2013). The mainstream current debate on the transition to renewables mainly focuses on the source of energy, but does not address the underpinning capitalist apparatus and power relations that sustain and are sustained by the energy generation (Alcott, 2010; Acosta, 2012; Hildyard et al. 2012, XSE, 2018; Ariza-Montobbio, 2015). The EROI of renewables should also be considered: while favourable, it is not always as favourable as that of coal, gas or oil (King and van den Bergh, 2018).

Furthermore, the growth of energy consumption remains unquestioned, with production only shifting (relatively) to other sources or technologies (Trainer, 2010). Renewables-related infrastructures therefore become increasingly strategic assets of contemporary industrial capitalism (Vargas, 2016; Hildyard, 2016), as well as a political priority for securing energy for global economies (see EU Energy Infrastructure Forum; Khanna, 2016).

In relation to hydropower, despite the large literature on social and environmental distress (see for example Fearnside, 2016 for Brazil) and evidences of significant over-expenditure (Ansar et al., 2014), the sector is today reviving in the name of sustainable development (Cole et al., 2014), climate mitigation, and the green economy (World Bank, 2009; IHA, 2012). Water infrastructure in general is also seeing an increase in terms of investment and political priority, including 'auxiliary projects' to enhance performance of older infrastructures (Perry and Praskievicz, 2017). At the same time, dams continue to be an emblem of the hegemonic beliefs of sustainability and technological modernization (Kaika, 2006), and praised by national governments and press as such, as in the cases of Belo Monte, Jirau, Santo Antonio in Brazil, Chepete and El Bala in Bolivia, Sardar Sarovar in India, Three Gorges Dam in China, Kariba Dam between Zambia and Zimbabwe, etc.

Despite greater interest in renewable energy, the end use of this energy and the political-economic production and consumption system it fuels is not problematized. The recent boom in hydropower expansion (Zarfl et al., 2014) is closely linked to industrial and urban growth, as it provides electricity to mining activities, factories, transport systems, huge malls, and cities. New regions are being targeted by the dam industry and the electricity generated carried towards areas of high consumption. Regions being dammed currently include several states in Mexico (e.g. Oaxaca), many smaller valleys in the Balkan countries, the states of Para, Minas Gerais and Parana in Brazil, the Yangtze basin in China, the Mekong and Ganges–Brahmaputra basin and the entire Himalayan range, among others (Zarfl et al., 2014).

Prominent scientists have spoken up against hydropower impacts on communities, local economies and the environment (Baviskar, 1995; Roy,

1999; McCully, 2001; Sneddon and Fox, 2008; Tullos et al., 2009; Grumbine and Pandit, 2013; Fearnside, 2016). Assessing the impacts of large-scale hydropower is complex, as hydropower implies a web of large infrastructures, which is rarely wholly captured by environmental impact assessments (EIAs). A hydropower project, for example, not only implies a dam, but also turbines and powerhouses, transmission lines, tunnels and water derivations, substations and transformers, etc (Gupta, 2015). Spatial and temporal fragmentation of EIAs, i.e. assessments that look only at specific infrastructural units and in short time frames, are examples of what has been called 'project reductionism' (Erlewein, 2013).

Social movements have raised concerns with hydropower and its related components as an infrastructure that leads to and supports the increase of extractivism, along with waterways, roads, or ports construction (see for example Vargas and Kucharz (2010) and Soldatelli Paim (2003) on IIRSA - Initiative for the Integration of the Regional Infrastructure of South America). Ecological and social implications are so vast that territories are undergoing processes of 're-ordering', which includes both economic and political control over the means to ensure the establishment of megaprojects (Ceceña, 2009).

These are common features of 'extractivism', a concept created to describe processes of dispossession and exploitation in Latin American economies, and defined as "those activities, which remove large quantities of natural resources that are not processed (or processed only to a limited degree), especially for export" (Acosta, 2013:62). Extractivism-related literature has generally examined materials extracted and exported across national boundaries (Acosta, 2012; Svampa, 2013; Gudynas, 2016), however similar dynamics also happen *within* countries, with certain regions devoted to the extraction of a specific commodity to be transferred to and consumed to other

centres of consumption. This becomes particularly relevant in the analysis of electricity as a commodity. Whereas electricity did not originally fall under the analytical lens of extractivism, it underpins and fuels extractivist activities, such as mining. Electricity is not a material commodity, and it's not extracted from the underground, yet its generation does have a material basis, including generation through renewable sources.

Hydropower production has been causing socio-environmental damages and therefore conflicts across the world for decades, due to unfair distribution of environmental goods and bads (Martínez-Alier, 2002; ejatlas.org). The technique of Cost-Benefit Analysis was developed int he 1940s precisely to balance in money terms the discounted money costs and benefits of dams. However, in doing so, other values were not considered (Multi-criterial evaluation later tried to respond to this need (Munda, 2004)). A large literature illustrates case studies of ecological conflicts over dams (Hensengerth, 2017; Poma e Gravante, 2015, Nüsser, 2013, 2014; McCully 2001), as well as global or regional comparative analyses (Del Bene at al., 2018; Siciliano et al., 2015). In such contentious contexts, different valuation languages are deployed to give visibility to ignored impacts and to defend alternative uses of territory (Avcı et al., 2010; Martínez-Alier, 2009; Zografos and Martínez-Alier, 2009). Contradictions are exposed when complex value systems related to environment (such as sacredness, livelihood, or biodiversity) are simplified to monetary valuation and issues of justice, democracy, and sustainability are eliminated from the agenda (Temper and Del Bene, 2016; Velicu and Kaika, 2015).

Recent Environmental Justice (EJ) literature has analysed movements challenging renewable energy carriers, such as wind farms (Cowell et al., 2011; Avila-Calero, 2017, 2018), or solar schemes (Hamouchene, 2015; Mulvaney, 2013). These studies identify how they can be controversial on

the ground and ecologically unsustainable, when no proper debate takes place on the scale, governance, ownership and decision-making process of the project, or the final use of electricity.

This chapter aims to contribute to this literature, by drawing attention to one of the expansion frontiers of hydropower, the state of Himachal Pradesh, in the Western region of the Indian Himalayan range. India has a very long tradition of dam building for energy generation, water storage and flood control purposes (Nandy, 2001), and hydropower development is one of the pillars of the XII Five-Year Plan of the Government of India for "green" and "inclusive" growth (GoI 2013). Many projects have, however, had to confront the opposition of local inhabitants, organised collectives, academics and journalists, etc. Although the majority of the cases of conflict refer to large plants, protests happen also against small hydropower plants[20].

Our research inquires into the deployed valuation languages of the opposition, examining 17 cases of resistance across the state identified through a collaborative activist-academic mapping process. We first ask how new extraction frontiers of renewable energies, specifically hydropower, are being produced and how they reconfigure the geographies of energy carrier production. Secondly, we inquire into why and how people oppose renewable hydropower projects, by looking into the valuation languages they deploy. Thirdly, we discuss how the concept of extractivism is relevant to the understanding of the implications of the expansion of renewable projects.

[20] This article does not discuss micro hydel projects (<5MW) that are managed by HIMURJA, a special agency in Himachal Pradesh.

4.2. Methods and materials

For fieldwork and data gathering, the authors combined social research methods and a collaborative mapping exercise engaging with a Himachal-based research collective, Himdhara. Data on the field and online was gathered between November 2014 and October 2015. Joint fieldwork by authors was done in November-December 2014 and April 2015 in Himachal Pradesh, with base in the Kangra district. This process of co-production of knowledge focused on creating dialogue and collaboration into a research process not only for scientific production, but also for producing an advocacy tool to be used beyond academic investigation (Durose et al., 2011). Also, it aimed to mobilize action-research (Fals-Borda, 1987) to collect data that are often neglected and not accounted for in official assessments, but are part of citizens' science and grounded knowledge because strictly connected to local ecologies (Funtowicz and Ravetz, 1994). Collected data was introduced in the database of the Global Atlas of Environmental Justice – EJAtlas (Temper et al., 2015), the largest repository of cases of socio-environmental conflicts globally. The cases we collected are specially featured in one of the 'Featured (or Thematic) Maps' that the platform offers, the Map on Environmental Justice and Hydropower in Himachal Pradesh[21].

[21] The map is accessible here: http://ejatlas.org/featured/himachal_pradesh Last accessed 12.03.2018

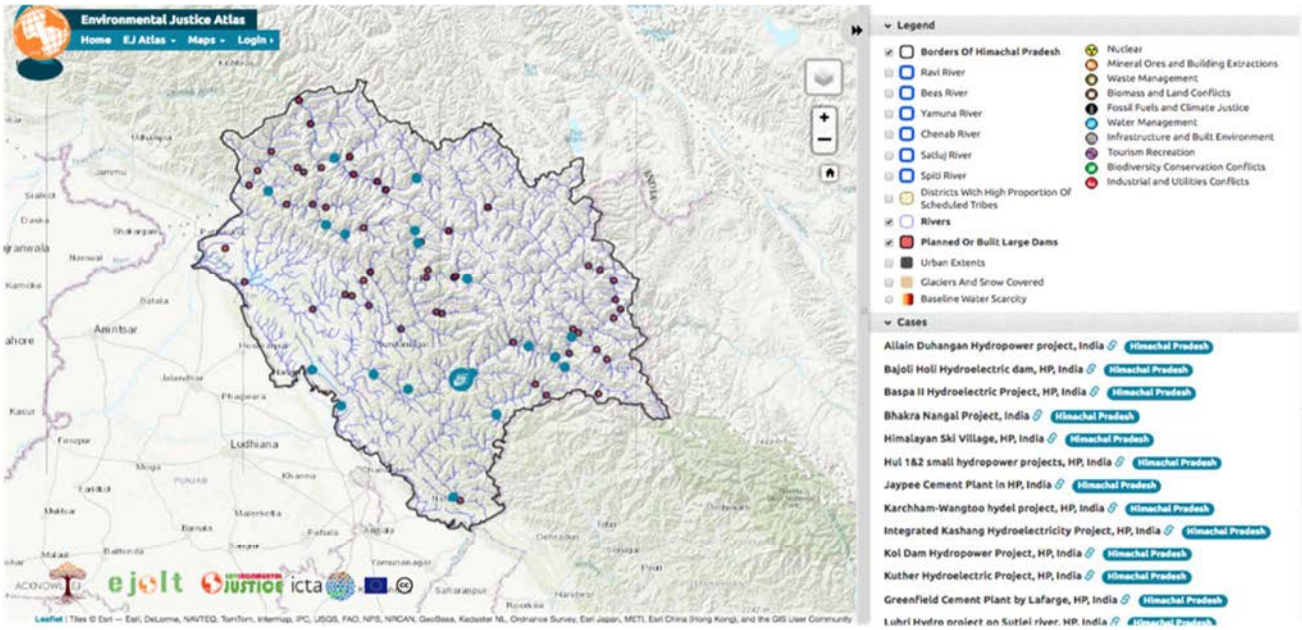

Figure 4.1: Screenshot of the online available interactive map of hydro projects in Himachal Pradesh. Blue points are conflictive projects under analysis in this article. In red, built or planned projects above 25MW of capacity. In the online platform, points can be selected to read the full data sheet. GIS layers can also be selected in the legend to give additional spatial information. Besides the 17 cases of conflicts identified, the map also shows in red dots the other planned or built large and medium size dams (>5MW) in the state. For some of these cases we have also encountered evidence of local opposition in the media, but not in substantive detail for including them in our analysis.

Data gathering was performed in two stages, including the definition of the most relevant conflicts and the collection of interviews. First, we had three main meetings with five members of the local collective Himdhara - Environmental Research and Action Collective, where we discussed our research questions and learnt about the context from their grounded experience in the region. In these meetings, 17 cases of relevant conflicts and places of resistance were identified and the related projects plotted on the map. These are the cases in the state where major organised mobilisations have occurred, which were reported in the local media. A plan was drawn to reach out individuals and groups in these areas; informants were identified

through snowball sampling and for their noteworthy work on the issue. Where contacting local people was not possible, we relied on the materials and statements released by the local groups leading the protests in different regions, either published online or shared through social networks.

In the second stage, 27 semi-structured interviews were carried out with the informants, in person or, due to considerable traveling distance, by phone. Some were in English and some in Hindi, and conducted and translated by the second author. We included sixteen opponents, eight people holding pro-hydro opinions, and three journalists. To incorporate views of the government, we conducted semi-structured interviews in April 2015 with three high government officials, the director of the Directorate of Energy, the Principal Secretary of the Department of Power of the Government of Himachal Pradesh, and the Chief Executive Officer of HIMURJA (H.P. Govt. Energy Development Agency), and with three engineers of a state construction company. Interviews with officials focused on the state policy on hydropower and renewable energies, successes and difficulties of implementation, compensation policies, and investment policy for national and international actors. When satisfactory information was not available in public domain, the authors used information requested by Himdhara through Right to Information Act[22]. A great amount of additional data and records informing this article come from the archives of national organisations and independent analysts, who have done significant research on the issue, often neglected in official documentation. When applied, they are cited in the text.

The data gathered, both qualitative and quantitative, was then processed through the database form of the EJAtlas, which allows a systematic organisation of the information and the comparative analysis of conflicts

[22]Through the Right to Information Act, any Indian citizen can request specific information from a "public authority" if not available publicly and the accountable body of Government is required to reply within thirty days.

(Temper et al. 2015). Qualitative data from interviews and from the movements' materials and statements was organised in the sections of the form referring to: "Description", "Development of Alternatives" and "Environmental Justice (Success for)". These qualitative sections, together with the check menu on "Impacts (Environmental, Health, Socio-economic)", "Actors" and "Form of mobilisation", were later coded through word frequency and content analysis. Verbatim transcripts of the interviews were also analysed through keywords and content analysis (Krippendorff, 2004), to identify the most recurrent valuation language in complaints by local communities and other experts.

The results of the coding process were then grouped up in 12 main categories of concerns and complaints, is shown in Figure 4.2 and discussed in the Section 4.4.1. For example, all arguments on depletion of water sources (water contamination, drying up of water springs, less irrigation, etc) were included in one category of valuation language.

4.3. Conceptual framework; the extractivist imperative of renewables

Our research starts from the question of if and how renewables belong to and replicate dynamics of extractivist economies, and if this question is relevant beyond the Latin American context. 'Extractivism' has been defined and analysed by authors belonging to different disciplines and with different backgrounds (Acosta 2012; Svampa 2013; Alimonda, 2011; Gudynas, 2012; see Introduction in section 1.1.2). Concerns particularly point at the dependency on the export of a few commodities as a main trait of extractivism. Gudynas (2012) specifically stresses governmental royalties as

a means to gain legitimisation and political support for the controversial exploitation of resources, especially in new frontiers of extraction.

Literature on 'extractivism' has so far mainly looked at materials extracted from local territories and exported across national boundaries, commodity chains and global trade (Moore, 2000; Acosta, 2012; Gudynas, 2016). Extractivism unfolds through what Svampa (2013) called the 'consensus of commodities'. This new 'era' of consensus reached Latin America after the decades of neoliberal Washington Consensus. In this context, national economies based their revenues on large-scale export of a few primary products, sustained by the international boom in prices of raw materials. Both neoliberal and national-popular governments participated in this new consensus, and led their countries into an extractivist economy. Svampa's contribution highlighted the global dependence of South American countries on extraction of minerals, biomass (like transgenic soybeans), and energy in its various forms (coal, oil, gas, hydroelectricity, bioenergy) either directly for internal consumption or for export as an input for mineral processing. It also contributed to acknowledging the territorial response of resisting communities to large projects along new 'commodity extraction frontiers' (Moore, 2000).

Analysis on extractivisms and extraction frontiers has mainly looked at materials (soybeans from Argentina, iron ores from Brazil, coal from Colombia, copper from Peru and Chile), commodity chains in global trade across national boundaries in both right- and left-wing governments in the first decades of the 21st century (Conde and Walter, 2014; Andreucci and Radhuber, 2017; Engels and Dietz, 2017). Electricity did not originally fall under these analytical lenses, or only when it served mining activities, mineral processing plants, etc. However, if extractivism is understood as a mode of accumulation through activities that remove large quantities of

natural resources to be sent far away (Acosta, 2013), the role of renewable energy infrastructures to extract electricity (directly for industries or for being immitted into the power grid) must be taken into account. Can the concept be then also applied to the internal extraction frontier of electricity production through hydropower (transferred and traded through a central grid)?

Arsel et al. (2016) suggest extractivist activities take a central role in planning and policy design as if they "enjoy a teleological primacy" (See Introduction, section 1.1.2). Following the authors, this 'extractivist imperative' shapes decisions beyond policies, and includes a mode of development and set of expectations. How relevant is the 'extractivist imperative' to understand the expansion of renewables? Are large-scale renewables also being promoted following that same imperative, to nurture and replicate the same or similar visions of development? Do renewables also replicate forms of 'cognitive' extractivism (Grosfoguel, 2016) along their expansion and how?

4.3.1 The Indian context and background

Why do we explore extractivist patterns in the expanding hydropower extraction frontier in the Indian Himalayas? The context is particularly interesting as the whole Himalayan range is currently a special target for the dam industry, due to the abundance of mountain waters and their yet 'untapped' potential. Similarly to other regions of the world, hydropower expansion here is deemed fundamental for the 'development of the nation', for alleviation of poverty, and for meeting carbon targets, especially in future scenarios where renewables will grow in importance and size in the national grids (World Bank, 2009, GoHP, 2012).

Indian economic growth of around 8% per year, relies on an increasing supply of energy and materials and consumption (an increasing social metabolism) despite biophysical constrains (Singh et al., 2012). The electricity sector relies mostly on local sources, such as coal, but increasingly also on hydropower, wind, solar, and nuclear (Martínez-Alier et al. in Dale et al., 2016). Globally, the country ranks 5th for installed hydropower generation potential, with almost 41,000 MW installed across the country, counting for around 20% of total national power generation capacity (GoHP, 2015a).

Although large dams were conceptualised in colonial India, subsequently built in the period between 1940s-60s (eg. Bhakra and Pong dam), it was the liberalisation of power sector in the 1990s that gave an impetus to a new wave of dam building. Specifically, a veritable 'hydro frenzy' was strongly facilitated by the liberalisation of the national energy sector in 2003, when the private sector rushed into this new 'blue gold' mining, attracted by important returns from selling electricity in the open market and for 'investment-friendly' policies at the state and national level (Dharmadhikary, 2009). To further boost the hydropower sector, in 2003 the then Prime Minister Vajpayee launched the "50,000 MW Initiative" to increase the installed potential. Additional schemes for boosting "clean" energy came afterwards, including the more recent plans of the Modi government for large-scale renewables, including hydropower dams, across the country. Yet, transmission and distribution losses and mismanagement of already existing power plants go poorly acknowledged as pressing concerns facing the country's power sector (Sheoli et al., 2014).

4.4 Findings. Hydropower as a pillar of the sustainability discourse in Himachal Pradesh

While in other states such as those in the North-East of India, hydropower is positioned as a major strategy to mitigate regional development discrepancies (Huber and Joshi, 2015), in the case of Himachal Pradesh, one of the better-off states in the country according to the HDI data (GOI, 2013), the government views hydropower as core to environmental sustainability and an ideal technology for 'green development'.

Himachal Pradesh is relatively a small state in India, with less than seven million people, and with no large cities as other Indian states. Despite having a predominantly rural economy, recent official figures report the declining share of agriculture and allied sectors in the overall state's domestic product, from 26.5% in 1990-91 to 9.4% in 2017 (GoHP, 2018). Meanwhile, the industrial sector in the state received important incentives, especially in 2006 as a result of host of subsidies introduced as part of amendments to the state's Industrial Policy (World Bank, 2016). The provision of land and commercial electricity at cheaper rates along with access to labour, roads and information technology paved the way for increased private investments. The government nowadays increasingly prioritises investments in renewable energy production, agricultural diversification, forest conservation schemes, carbon offsetting programmes, and in devising 'sustainable' tourism infrastructure.

Plans for a sustainable development of the state aim therefore at maximising the harnessing of hydropower potential across the state, on both large and smaller rivers in order to generate more renewable energy, reduce carbon emissions and also sell electricity outside the state (and generate revenues out of that). Consequently, a widespread consensus on the need for more

related infrastructures exists in the two major parties of the state, the Congress Party and the Bharatiya Janta Party, and with significant support from the World Bank and other international donor agencies. While central and state governments' share in hydro development is considerable, the Electricity Act 2003 and the HP Hydro Power Policy 2006 announced special measures to attract domestic and international private investments in the sector by reducing taxation and simplifying procedures (World Bank, 2016). However, socio-environmental organisations and researchers also identify a dilution of environmental regulation as incentives (Dharmadhikary, 2009) and the fast-tracking of the clearance procedure with respect to hydropower projects (more details in next section).

Name of the Basin	Assessed Potential MW	Developed Potential MW			
		State	Private	Mixed	Total
Satluj	13332	164.75	1346.7	4208.1	5719.5
Beas	5995	232.5	433.2	2043.6	2709.5
Chenab	4032	4.9	0	0	4.9
Ravi	3237	5.54	82	1269	1356.5
Yamuna	840	79.95	0	131.57	211.52
TOTAL	27436	487.64	1861.9	7652.27	10001.92

Table 4.1 Distribution of Assessed and Harnessed Potential in the five major river basins of Himachal Pradesh, according to the *Economic Survey of Himachal Pradesh*. Govt. of Himachal Pradesh, Economics & Statistics Department.[23]

According to official assessments of the HP government (GoHP, 2015a), hydropower potential amounts to 27,436 MW, out of which 23,500 MW is harnessable, counting for around 15% of total hydro potential of India. A potential of 20,640 MW stands allotted to public and private companies

[23] (Note that a further 262.62 MW are generated through mini hydel projects(<5MW) that are not counted here and go beyond the scope of this analysis. They are regulated by HIMURJA, a special section for smaller projects of the H.P. Govt. Energy Development Agency.)

(April 2015), out of which more than 10,000 MW has already been commissioned (GoHP, 2015a). Most of the energy generation today (around 80% of the harnessed capacity) comes from medium and large size projects above 25MW of installed capacity.

As shown in Table 4.1, the Satluj basin, which runs through the Kinnaur, home to scheduled tribes, comprises the highest potential with 13,332 MW and has several projects currently under construction. Beas basin follows with 5,995 MW. Several dams are already in operation on the major stretch and on smaller tributaries, which have dried-up the river in several spots. In Ravi basin, hydropower projects were first initiated in the 1980s and now the estimated potential stands at 3,237 MW. The Chenab basin is the last frontier of hydropower industry in the state, and runs through remote border areas of Lahaul and Spiti district and Jammu and Kashmir, the former comprising of a minority Buddhist population. With its large untouched potential (up to 4,032 MW by 2015), it has today 20 projects lined up. Finally, the Yamuna basin with identified potential of 840 MW (Directorate of Energy, 2018) has few projects lined up. For this river, the state company HPPCL has created a Special Purpose Vehicle, namely, Pabbar Valley Power Corporation (after the name of one of its main tributaries).

The figures of the hydropower 'estimated potential' in the state have been increasing over time, with a significant jump in the last years with the development of remote sensing technology, as new spots with waterfall or slope are being identified. In most cases, due to distances and poor availability of road connection, no field visit or specific assessment of geological and hydrological conditions are carried out, but nonetheless new projects are being allotted on those spots (Interview with HIMURJA officers, April 2015). This may provoke an ecological risk which several authors have warned about (Pandit and Grumbine, 2012; Agrawal, 2013; Grumbine and

Pandit, 2013; Sharma and Rana, 2014; Ahlers et al., 2015); meanwhile, there are limits to the Environmental Impact Assessments in capturing the complexity of ecological disruption and social distress (Erlewein, 2013; Sinclair and Diduck, 2000).

In order to boost the sector, international donors and companies have also increasingly engaged in the dam industry; for example the Asian Development Bank funded the HP Clean Energy Development Program and Clean Energy Transmission Investment Program (signed in 2008), which funds the infrastructures for the evacuation of electricity, in partnership with the state company HP Power Corporation Ltd. (HPPCL). According to the Energy Head of the ADB South Asia Department, the programs are being designed in a manner to accommodate the future hydropower plants of the state, with special attention to the private investors (Interview with ADB, April 2015; see also Evans and Hamner, 2003). An ADB engineer working at 111MW Sawra-Kuddu hydro project in Pabbar River of Shimla district affirmed that the current trend is to maximise the approval of projects, through allotting the less viable (due to ecological conditions or social discontent) to the state company and the most profitable ones to the private sector (Personal Communication under request of anonymity, interview April 2015).

Private companies investing significantly in the state are registered across India (namely, from outside the HP state), such as Patel Engineering from Mumbai, or Grandhi Mallikarjuna Rao (GMR) Energy Limited from Chennai, but also internationally, such as the UK-based Greenko Group, the Norwegian Statkraft, Andritz from Austria. Bigger companies control larger projects; Jindal Energy Limited, for example, now runs the 300-MW Baspa HEP, the first project allotted to an Independent Power Producer (IPP) after the liberalisation of electricity sector, as well as the largest private plant in

India at the moment, the 1200-MW Karcham-Wangtoo HEP (both projects previously belonged to another Indian giant, the Jaypee Group). Apart from hydropower, companies such as Jindal and Jaypee benefit from the monopoly over cement and several other infrastructural projects in the state.

Project name	River and District	Status	Investors and companies	International and finance institutions
Integrated Kashang Hydroelectricity Project 243MW	Satluj - Kinnaur	Planned	Hindustan Construction Co. Ltd (India) Himachal Pradesh Power Corporation Limited (India)	Asian Development Bank
Baspa II Hydroelectric Project 300MW	Satluj - Kinnaur	In operation	Jaiprakash Power Ventures Limited (India) Jaypee Group (India) JSW Energy Limited (India)	None found
Karchham-Wangtoo Project and its transmission line 1200MW	Satluj - Kinnaur	In operation	Jaypee Karcham Hydro Corporation Ltd (India) Jaypee Group (India) Jaypee Powergrid Limited (India) Power Grid Corporation of India Limited (India) Andritz Group (Austria)	None found
Nathpa Jhakri Hydroelectric Project 1530MW	Satluj - Kinnaur	In operation	ABB Kraftwerk (Switzerland) Siemens (Germany) Continental Construction Corp Ltd Satluj Jal Vidyut Nigam Limited (India) Foundation Corporation of Canada (Canada) Salini-Impregilo (Italy) Alstom (France) Bharat Heavy Electricals Limited (India) Hindustan Construction Co. Ltd (India)	World Bank International Bank For Reconstruction And Development
Rampur Hydroelectric Project 412MW	Satluj - Kullu	In operation	Satluj Jal Vidyut Nigam Limited (India)	World Bank International Bank For Reconstruction And Development
Luhri Hydro Project modified from 775MW to 219MW	Satluj - Kullu	Planned	Satluj Jal Vidyut Nigam Limited (India)	World Bank
Koldam Dam Hydropower Project 800MW	Sutlej - border of Bilaspur district and Mandi district	Under construction	National Thermal Power Corporation (India) Italian-Thai Development Public Company Limited [Italthai] (Thailand) Bharat Heavy Electricals Limited (India)	None found
Bhakra Nangal Project 1350MW + water storage	Satluj - Bilaspur	In operation	Bhakra Beas Management Board (India)	None found
Hull 1&2 small hydropower projects 4.5MW	Ravi - Chamba	Proposed	Hul Hydro Power Private Limited (India) M/S Astha Project (India) M/S First Hydro Generation Private Limited (India)	

			First Climate (Germany, Investment consultant) Wexford Capital LLC (USA)	
Kuther Hydroelectric Project 260MW	Ravi - Chamba	Planned	JSW Energy Limited (India)	none found
Bajoli Holi Hydroelectric dam 180MW	Ravi - Chamba	Under construction	GMR Bajoli Holi Hydropower Private Limited (India) GMR Group (India) GMR Energy Ltd (India)	none found
Jispa Hydroelectricity Project 300MW + water storage	Chenab - Lahul Spiti	Proposed	Himachal Pradesh Power Corporation Limited (India)	none found
Seli Hydroelectricity Project 400MW	Chenab - Lahul Spiti	Planned	Hindustan Power Projects Private Limited (India)	none found
Allain Duhangan Hydropower Project 192MW	Beas - Kullu	In operation	Malana Power Company Limited (India) Rajasthan Spinning & Weaving Mills Limited (India) Allain Duhangan Hydro Project Limited (India) SN Power (Norway) AECOM (Canada)	International Finance Corporation Italian Carbon Fund (Italy) Power Finance Corporation
Nakthan Hydroelectricity Project 520MW	Beas - Kullu	Planned	Himachal Pradesh Power Corporation Limited (India)	none found
Renuka Dam Project 40MW	Yamuna - Sirmour	Planned	Himachal Pradesh Power Corporation Limited (India) Patel Engineering (India)	none found
Sawra-Kuddu hydroelectric project 111MW	Yamuna - Shimla	Under construction	Himachal Pradesh Power Corporation Limited (India) Patel Engineering (India) Andritz Group (Austria) Kirloskar Construction Company Limited (India) Coastal Projects Limited (India)	Asian Development Bank

Table 4.2 List of the conflictive projects under analysis in this study. For each project, we provide the corresponding basin and district name, the status of the project at the time of writing, the investing companies (depending on the availability of data, they can be relevant components providers, building companies, or owners of the plants), and financial capital invested

4.4.1 Socio-environmental conflicts and the valuation languages of resistance

This section illustrates the results of the analysis of the EJAtlas database sheets, and interviews conducted in Himachal. As explained in Section 4.4.2 of this thesis, in the 17 cases of conflicts analysed we identified 12 main languages of valuation in the opposition. We notice three broader issues these languages indicate: a) disruption of local ecologies and sources of livelihood (‘*depletion of water sources’*; ‘*deforestation’*; ‘*livelihoods affected’*; ‘*waste and pollution’*; ‘*sacred or wildlife spots affected’*; ‘*damages in houses*’); b) a systematic violation of law and regulations (‘*violation of environmental law*’; ‘*inadequate compensation’*; ‘*inadequate EIA’*); and c) violent character of forced hydropower development (‘*fear of risks’*; ‘*violation of workers’ rights’*; ‘*violent repression’*).

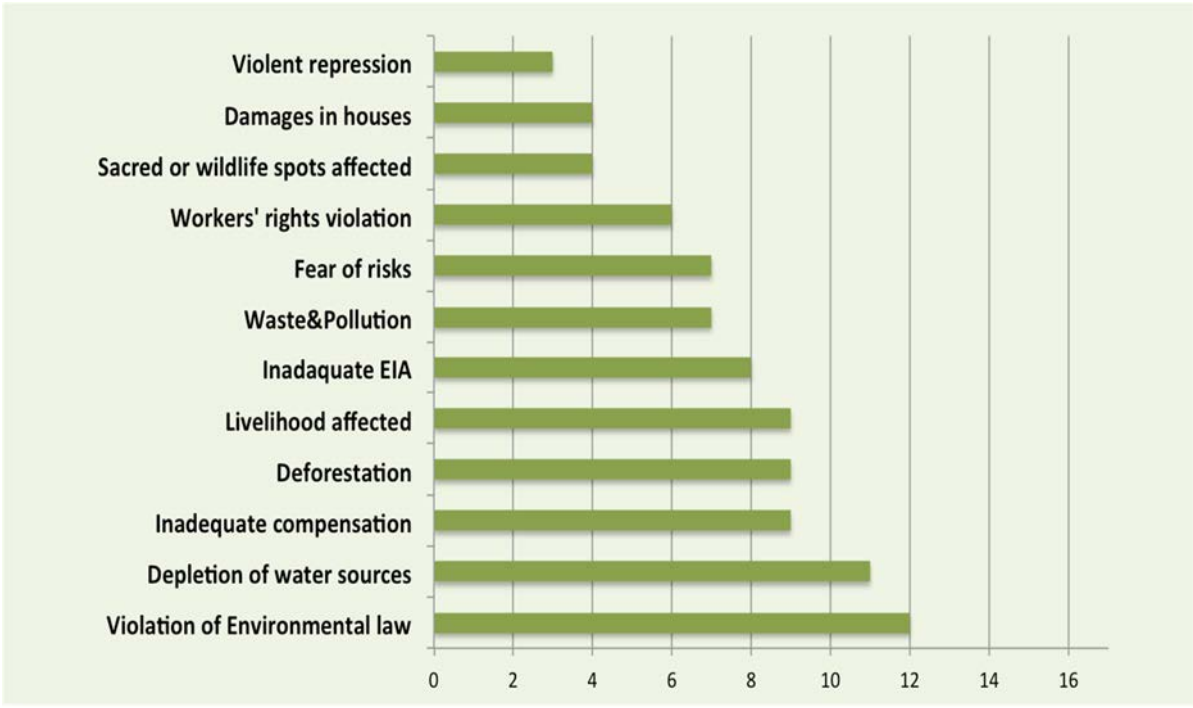

Figure 4.2: Absolute frequency of valuation languages of the resistance to hydro projects, according to the EJAtlas. As each of the categories are interrelated and include both substantial and procedural forms of injustice, please note that they can appear simultaneously in more than one case.

a) Disruption of local ecologies and sources of livelihood

Our data show that depletion of water sources is the most recurrent concern for local inhabitants. There were two main factors, the first being the decrease in water flow in the river due to hydropower cascading, which disrupts the hydrological cycle. Despite the legal obligation of HP Hydropower Policy to maintain a minimum flow of 15% based on the minimum lean season into the riverbed, this is seldom applied (See also Erlewein, 2013). Hydropower projects, both large and smaller ones, are also reported to affect irrigation systems. Himachal Pradesh farming largely relies on the extensive network of community-managed gravity flow irrigation systems, known as *kuhls* (Baker, 2011). Dams work provokes damages to the physical infrastructure of kuhl canals or diverts waters, leaving the canals dry (Baker, 2014). Farmers must therefore shift to rain-fed cultivation, with a decreased and highly unpredictable output. Although companies have the obligation by law to compensate for such loss, it is actually very difficult to assess the monetary value in the long term.

The second major cause for water depletion is the tunneling activity and blasting. One of our informants reported:

"Blasting for tunnel construction is usually carried out at night in hope of creating less troubles for themselves (for the company). [...] They (companies and state agencies) claim no impacts on it, but our physical calculation of water springs show the contrary. The villages above the 11 kms long tunnel had 42 natural water aquifers, only 3 to 4 still have water running."
(Interview with ex village *pradhan* –head of the local collective Gaon Vikas Samiti in Sawra-Kuddu HEP area, one of the projects funded by ADB. April 2015).

Concerns were also raised over impacts to sacred sites and wildlife sanctuaries in at least three locations. In the area of Koldam (Satluj river basin), local people protested as the reservoir is going to submerge the hot spring in Tatta Pani, a popular religious pilgrimage destination[24]. The Majathal Wildlife Sanctuary, home to the Cheer Pheasant, *Ghoral*, barking deer and other wildlife, is also going to be partly submerged, triggering concerns and the outrage of environmentalists, who question the fact that it does not appear in clearance documents required to start construction works.

Concerns by local inhabitants have been reiterated in scientific literature, which extensively warns about potential climate change impacts on water availability, and on the groundwater recharge capacity in the Himalayas (Xu et al., 2009; Immerzeel et al., 2010). Figure 4.3, for example, shows data by the World Resource Institute, according to which almost the whole area of Himachal Pradesh already suffers from high to extreme water stress (The Acqueduct Project, WRI[25]). The northern district and the eastern part of the state are of particular concern, as they also see a high concentration of hydropower projects, both under construction and planned.

[24] In the month of January, Makar-Sankranti festival is celebrated at Tattapani and it is popularly called "Mini-Kumbh" of Himachal Pradesh.

[25] Data visualization is available here: http://www.wri.org/our-work/project/aqueduct/. Last accessed 22.02.2018

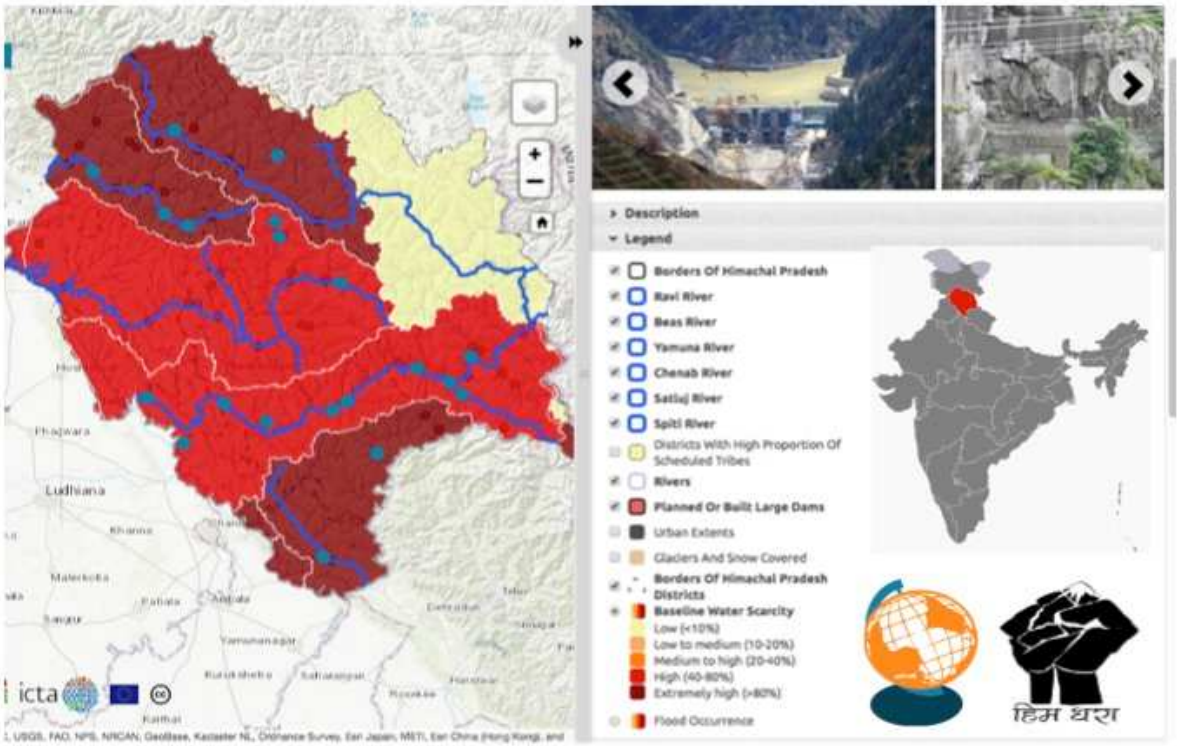

Figure 4.3: Screenshot of the interactive Himachal Pradesh map, with GIS layers on water stress applied. Baseline water stress measures the ratio of total annual water withdrawals to total available annual renewable supply, accounting for upstream consumptive use. Higher values indicate more competition among users. Source: World Resource Institute, Aqueduct Water Risk Atlas

Forests are the second most frequent concern related to the environment. They are a major source of livelihood as they provide fodder, non-timber forest products, herbs and firewood. Our informants claimed that the portion of forest land diverted for hydro projects is usually much higher than official figures, and EIAs do not officially account for land diversion for transmission lines. This is particularly relevant in a state like Himachal Pradesh, where communities' economy is heavily dependent on forests (agricultural land accounts for less than 10 percent[26]). Water and forests are the basis of the sources of livelihood for Himachali people. However, horticulture represents a key source of income, especially in Kinnaur district. Our informants

[26] More details here: http://www.himdhara.org/wp-content/uploads/2013/12/Re-Satluj-public-consultation-7-Dec-2013.pdf

reported disruptions in apple pollination process due to excessive dust and soot deposits from hydropower construction and tunnel blasting.

Other significant ecological alterations are those on fisheries and aquatic ecosystems putting the livelihoods of fishermen at risk. Again, in Kinnaur, it was reported that fish species have altogether disappeared between the Rampur HEP, Karcham and Tapri stretch (Field Notes, April 2015), which clearly points to the discontinuity in flow of Satluj river due to hydropower cascading.

Another disputed issue is the potential risk of flash floods, of seismic risk and of the consequent collapse of dam infrastructure, as most districts of the state are flood and earthquake-prone (MoES, 2015). In June 2013, a massive flash flood unfolded in the neighbouring state of Uttarakhand, claiming over 6000 human lives (Chopra, 2014). The district of Kinnaur in Himachal Pradesh too experienced extreme rainfall causing damages to fields, apple orchards and livestock (Asher, 2015). According to the Aqueduct atlas data, the whole area of the state is under 'extremely high' and 'high' risk of floods, thus consolidating the concerns of communities on the ground. Concerns also emerge as the link between dam construction and dam-induced seismic activity is being probed by scientists (Gupta, 2002) and acknowledged also by high-level institutions in India[27].

[27] After the Uttarakhand disaster in 2013, the Supreme Court of India ordered the government to to examine the relation between damming the rivers and earthquakes. The court also directed the Ministry of the Environment to constitute an expert body to make a detailed report as to whether hydroelectric power projects existing and under construction have contributed to the environmental degradation and if so, to what extent (Expert Body, 2014)

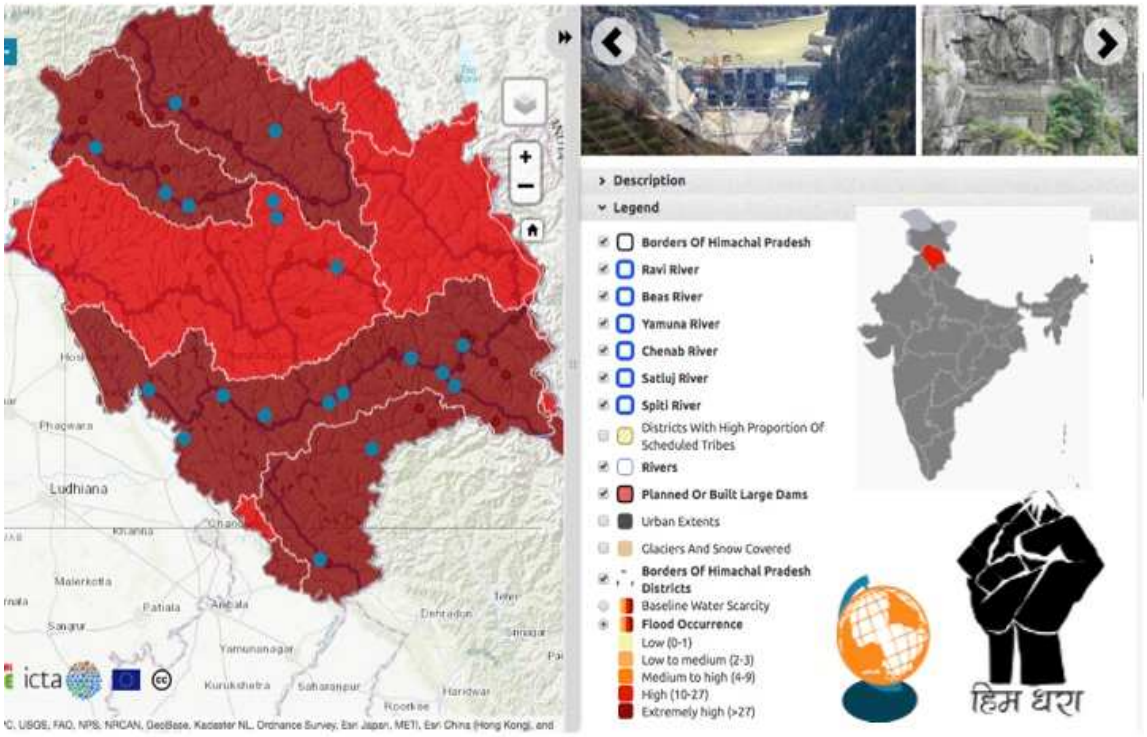

Figure 4.4: Screenshot of the interactive Himachal Pradesh map, with GIS vector layers for flood risk applied. They show the high occurrence of floods that happened across the region; flood occurrence is a count of the number of floods recorded from 1985-2011. Source: World Resource Institute, Aqueduct Water Risk Atlas

Affected communities also attribute slope destabilisation and landslides to unregulated blasting for tunnel construction. In 2014, a massive landslide in Urni village in Kinnaur district caused severe damages to houses and village public infrastructure. Urni is sitting precariously above the junction of the Head Race Tunnel and the adit tunnel[28] of the newly operational 1200 MW Karchham Wangtoo project. Our informants expressed disappointment over the fact that the state authorities negated responsibility by attributing recurring landslides to thin soil cover, rainfall and snowfall fluctuations,

[28] The adit tunnel is an entrance to an underground tunnel which is usually horizontal or nearly horizontal, by which the other tunnel can be entered, drained of water, ventilated, etc

further exacerbated by local flood irrigation methods used for agricultural purposes. There has been no official acknowledgment of the linkages between haphazard infrastructural planning, unregulated hydropower construction and related infrastructure in that area (Field Notes from an RTI application filed by Himdhara to State Geological Department, April 2015). Tunnel blasting and landslides have also damaged homes and farms, which are not always compensated for.

"Most houses have visible cracks by now. I personally had to rebuild the foundation wall of my house thrice. We no longer feel safe in our homes as blasting work is carried out at night. We have received no compensation whatsoever"

(Interview to village head at Sawra-Kuddu HEP area, April 2015).

Figure 4.5 Cracks in village homes due to blasting for tunnels inside the mountains. Area of Sawra Kuddu dam, April 2015. Photo: Daniela Del Bene

b) Systematic violations of law and regulations

Local communities have denounced systematic violations and dilutions of laws to fast-track these projects. Regular violations of the Hydropower Policy 2006, of the Forest Rights Act, of Panchayat (Extension to Scheduled Areas - PESA) Act, and of the EIA (Environmental Impact Assessment) Notification 1997 characterise at least 12 out of 17 cases analysed. An apt case of illegality is the Bajoli-Holi HEP in Chamba district. In 2008 the company GMR, in absence of a fair consultation with local people shifted the project's tunnel and powerhouse location from the uninhabited right bank to the left bank of the river Satluj, which comprises of four *gram panchayats* (villages), dense forests and rich agricultural land. According to the company, the shift was needed due to "greater techno-economic feasibility". However, this change in plan occurred without any EIA. The illegal decision of the company formed the basis of local opposition and led to a formation of a unique women-led struggle.

Right to Information (RTI) applications filed by Himdhara, especially on issues where official and public knowledge is minimal, have brought repeated violations of hydropower policy provisions into the public domain. For instance, the Irrigation and Public Health department in one of its responses admitted the absence of a state agency to monitor water flows, and in another case reported absence of a safety authority to oversee hydrological and infrastructural violations. In 2009, a response disclosed that 43 out of 167 (26%) of water sources in Karcham-Wangtoo area had dried up and many other discharges were severely reduced (Field Notes from an RTI application filed by Himdhara to State Geological Department, April 2015).

Unsatisfactory reparation measures, such as poor monetary compensation, or assigning lower quality land as compensation have been highlighted in at least 9 of the contentious cases reported on the map, despite the rules of the

National Rehabilitation and Resettlement Policy (NRRP) 2007, or the state Hydro Power Policy, 2006. For the Karcham-Wangtoo project, around 800 villagers since 2010 have been fighting a legal battle demanding compensation for dried up water springs, which are the only source of irrigation for apple cultivation and other cash crops[29].

Similarly, for the operational 412-MW Rampur project touted by World Bank as its 'success story', the project faced severe criticisms locally and nationally for inadequate rehabilitation measures of residents. In the case of the highly controversial Renuka project in the Sirmaur district, huge disparities were reported between the prices at which the company purchased the land, and the monetary compensation offered to locals. Activists in Himachal Pradesh also lament that although HP Hydropower Policy 2006 rules that 12% of electricity produced by any HEP should go for free to the state as compensation and additional 1% of electricity (converted to equivalent money) to local communities through the Local Area Development Fund (LADA), the reality on the ground falls short (facilities are built but not put in operation, services are not properly given, etc). As illustrated also by Baker (2014)'s analysis of forty-nine commissioned small hydropower projects in HP, LADA programme implementation has been highly unsatisfactory in most of the cases.

Another reported issue is of discrepancies in undertaking a more comprehensive impact assessment. In 2014, the Directorate of Energy commissioned a study to the Indian Council of Forest Research and Education (ICFRE) for a Cumulative Environmental Impact Assessment (CEIA) of the Satluj basin (Directorate of Energy, 2014). This intervention was initially viewed positively by the local population, however, our

[29] More details here: https://sites.google.com/site/dissentmatters/home/opinions/andar-se-solid. Last accessed 10.08.2016

informants termed the process as a mere “formality”. Locals and environment organizations termed the process as an eyewash for completely overlooking the impacts of the three major projects (Nathpa Jhakri, Karcham Wangtoo and Baspa HEPs). Major issues like the impacts of massive muck dumping, tunneling and air pollution were completely denied, and the study failed to establish a clear baseline data for its assessments (Himdhara, 2014).

When the CEIA study was first presented publicly in Kinnaur, the affected community questioned the non-availability of relevant documents in the local language and the undemocratic nature of consultations during the study period, in violation of the EIA Notification 1997. The irony is that in order to look into the discrepancies in the consultation process, later in January 2015 the Panel of Environmental and Social Experts (PESE) set up by the same Government of Himachal Pradesh observed that: "popular opposition to large hydro power projects on the Sutlej is being fanned by the establishment’s ‘indifference’ to the problems of the people". The panel also declared that the CEIA’s conclusions were “a matter of opinion and not supported by facts and figures” (GoHP, 2015b), acknowledging people’s claims in this way.

c) Violent character of forced hydropower development

Globally, environmental conflicts around hydropower projects have reported high intensity, not solely in terms of mobilisation but also of repression (Del Bene et al. 2018). Himachal Pradesh is no exception. Such intensity can assume a violent character, ranging from severe physical repression to other less visible forms, such as criminalisation of communities, and deliberately ignoring a diffused sense of fear for potential impacts and the large uncertainty about ecological disruption and compensation measures.

People's protests faced violent repression in at least three of the analysed cases. For Karcham Wangtoo HEP, where the opposition has been ongoing since 2005, the first visible sign of state repression happened in December 2006, at a people's convention organised in opposition of the project. The local administration responded by declaring Section 144 of the penal code to suppress the public demonstration. The event took a violent turn when peacefully protesting locals were "*lathi* charged" (beaten up by police with sticks) leading to arrest of movement leaders and injuring several others.

Instances of violence are not only restricted to large HEPs; in February 2010, the contractors involved with Hul small hydropower projects, a joint venture of local and international private capital, including hedge funds registered in tax havens, openly attacked those opposing its construction with swords, guns and sticks. Five residents suffered life-threatening injuries. The conflict on the Hul projects, though small in scale, managed to unite five *panchayats* (villages) under the banner of *Sal Ghaati Bachao Sangarsh Morcha* (Movement for Saving the Sal Ghaati).

The tribal area of Lahaul and Spiti District presents a different critical positioning, which should be understood in the larger context of right-wing crusade and pro-corporate establishment to label and criminalise non-conforming voices as "anti-development" or "anti-national". Here, people uniting against the 300 MW Jispa storage dam by HPPCL, and 400 MW Seli hydropower project by private company Hindustan Power Projects Private Limited (HPPPL) have repeatedly denounced the state's branding of their struggle as "anti-progress". People in project-affected areas instead frame their struggle as upholding the fundamental right to livelihood, reject a displacement-driven model of development, and the mainstream conception of tribal populations as innocent, ill-informed, and in need of 'development'.

Finally, we found at least six cases where agitations occurred because of the violation of labour rights. The unskilled labor force for hydropower construction is drawn from some of the most impoverished states of India like Jharkhand and Bihar, recruited through a network of private contractors and subcontractors. Workers work in precarious conditions with minimal safety measures, their housing colonies are makeshift shelters exposed to extreme climatic conditions and often located very close to the construction sites. As in most infrastructural works in India, these 'able bodied' men are anonymous victims of the construction industry (Rogaly, 2009). According to informants of The Tribune, for the construction of Karcham-Wangtoo HEP more than 100 workers have lost their lives to accidents inside the tunnels, and many of them were not registered[30]. Workers are currently struggling to get these accidents investigated and responsibilities made clear and public.

To recap, interviewed communities expressed their concerns through different 'valuation languages' and mainly: fear of geological risks, impacts over sites of identitarian and religious values and pilgrimage spots, destruction of wildlife sanctuaries, irreversible and large-scale impacts over water sources and depletion of agriculture, infringement of democratic and labour rights, and increased state violence to repress protests.

[30] The Tribune, 8th March 2015. "1,300 workers to step up stir against Jaypee". Available at: http://www.tribuneindia.com/news/himachal/1-300-workers-to-step-up-stir-against-jaypee/50645.html Last Accessed: 28.07.2016

4.5. Discussion and conclusion

"Lahaul is already a land on the path of spiritual,
economic and ecological 'development' and 'well-being'. [...]
Are we all not seeking a better life and 'well-being' for the whole society
through this 'development'?"

Abstract from a letter by committee Save Lahaul Spiti

We have shown how the hydropower extraction frontier is expanding in Himachal Pradesh, as well as the impacts and uncertainties that accompany it, and how local communities and organised groups mobilise against it. At a time when scientific evidence on unprecedented changes in Himalayan snow melt and water discharge is being produced (Khanal et al., 2015; Mukherji et al., 2015), and the correlation between poorly planned infrastructure construction and floods in Uttarakhand has been dramatically proved, including by reports by a central government agency (MoEF, 2014), local communities and many scientists warn that persevering with large-scale hydropower plans in ecologically and geologically sensitive areas will likely increase the risk of human-induced disasters.

While the literature on extractivism has so far mainly looked at Latin American export-dependent countries and extraction of materials, we need to inquire into whether the expansion of renewables across the world is replicating similar patterns and contentious ecological economic dynamics. Increasing renewables potential requires significant and rapid investments into new infrastructures, which have to maximisze power generation in whatever viable area of the country.

First, we observed that in the name of green development and sustainability, hydropower potential and the number of HEPs has expanded in the Himalayas. The hydropower industry has first targeted major rivers with large plants, but is now also promoting smaller dams and run-of-river projects in order to exploit smaller streams too. They include medium-sized and smaller plants in order to make them more ecologically and socially acceptable, but the number increases to maintain financial viability and profitability. The hydroelectricity frontier in the Himalayas has become imprinted and visible in a landscape with drastically modified hydrological-cycle and human settlements, made up of mined mountains, cement plants, dams, tunnels, power houses and a large web of transmission lines and roads interconnecting all the links of the electricity generation chain. A single small-sized plant cannot be understood outside the web of other interrelated and interdependent plants; isolated projects (and related infrastructures such as roads, transmission lines, etc) would in fact not even serve their function and would not be financially attractive. One needs to question therefore what defines the scale of a project. Can a series of smaller plants interconnected and interdependent throughout a whole basin still be considered small-scale? The individual plants might be smaller in size, but the expansion occurs at large-scale.

Remote, smaller, and less interconnected valleys and villages along smaller rivers will be more exposed to the advancement of this frontier. Diversion of water through small hydropower plants that run through villages further shifts water rights from households that depend on them, to private entities (Baker, 2014). In this way, hydropower extraction frontiers turn river basins into ‘sacrifice zones’ (Lerner, 2010), devoted to extraction and generation, thus creating forms of dependence and exclusion of a certain section of the society and economy. Despite tentative efforts to look more comprehensively into impacts generated (for example through Cumulative Environmental

Impact Assessments in the Satluj basin), studies are still limited by a reductionist bias.

As renewables expand, we need to examine the forms of consensus that take shape around the need for rapid promotion of clean energy and therefore the need for more renewables infrastructure. If extractivism is underpinned by a 'Consensus of Commodities' (Svampa, 2013), we need to inquire into other complementary forms of consensus that justify and promote the expansion of large-scale renewables, beyond commodities. We need to examine the infrastructures that allow and sustain electricity generation. Among the new 'peripheries of production' (i.e. energy production) (Avila-Calero, 2018), we suggest the consideration of a 'consensus of (energy) infrastructures', that unites political parties (Nüsser, 2013) and finds support among donors, as well as national and foreign companies. Increasing renewables potential needs massive and fast investments into new infrastructures, which have to maximize power generation in whatever viable area of the country.

Despite this 'consensus of (energy) infrastructures', studies have shown that hydropower potential and power generation is usually much lower than projected, with cost and time systemically underestimated (Ansar et al., 2014), and revenues falling short of desired expectations[31]. Calculations at the national level for the Financial Year 2014-15 by the organisation South Asia Network on Dams, Rivers and People (SANDRP) show diminishing production from hydro by 4.25% from the previous year, despite an increase in the overall installed capacity of projects (SANDRP, 2017). However, dam construction is often a business sector in itself for contractors and subcontracted companies; even when the commodity (electricity) is not produced/extracted, infrastructures are built.

[31]Decrease of revenues is explained in an article in the Hill Post by our informant, Manshi Asher, of Himdhara organization: http://hillpost.in/2016/10/himachal-hydro-policy-a-failure-a-environmental-disaster/107524/. Last accessed 20.01.2017

In Himachal Pradesh (and elsewhere in the Himalayas), we can see the formation of what might be called an 'internal extractivism'. Although hydropower from the Indian Himalayas is not a commodity to be exported outside national boundaries, electricity is sold to other states to feed the national grid as well as industrial and extractive activities. It provides an example of primary commodity flows based on extractivism *within* India, to an extent similar to bauxite or coal coming out of the mining belt of Odisha, Chattisgarh, or Jharkhand (Das, 1995; Temper and Martínez-Alier, 2013).

Hydropower is seen as having a comparative advantage, requiring low labour-intense activity and little internal processing (no added economic value). State authorities receive significant revenues (12% of power produced for free, plus funds for local amenities and facilities), which should be reinvested in development projects for the state. However, hydropower hardly benefits or can compensate for the loss of people's livelihoods in the affected areas. If we consider Georgescu-Roegen's (1971) classification of natural resources into Funds, Stocks and Flows, we could say that a river is like a durable fund that provides sustainable flows. However if the river is interrupted by a dam, it becomes like a stock causing ecological disruption to its own ecology (fauna and flora depleting, siltation, etc). Environmental or cultural/spiritual values and non-human lives cannot be compensated either. Furthermore, it reproduces dependency of the state government from outside revenues, and dispossession of local communities from their sources of livelihood, and in some cases putting their homes and lives at risk.

While the 'extractivist imperative' (Arsel et al., 2016) locks in policies, governments, and communities into an ecologically and socially disruptive economy based on material extraction, in parallel we have a 'renewability imperative' that urges rapid construction of renewables megaprojects for

securing energy provision, and ensuring consistency with both development and sustainability discourses.

Scientific literature has identified that it is still unclear whether the pace of deployment of renewable energy systems is actually reducing climate chaos (York, 2012). Climate change mitigation measures would require that each unit of renewable energy generated would displace at least the equivalent unit output of fossil fuels. However, renewables are largely additive, rather than substitutive of fossil fuels (York, 2012). Burke and Stephens (2017) also suggest that, from a biophysical perspective renewables should only be deployed at a pace global and local environments can safely accommodate. Renewable energy futures, if developed under the legacy and with the same logics of the fossil fuel era risk replicating the same ecological, social, and cultural issues and injustices.

Therefore, despite the rapid disruption of our climatic conditions, transitions towards the decarbonisation of societies should not only recover an ecological soundness, but also engage in a broader debate of what the final goals are, what transition is desirable, who benefits, who loses, who and how decides, and who owns and controls what?

Our research shows that communities and environmental justice organisations organize and stand in protest against many hydroprojects in the state of Himachal Pradesh, disrupting this way such consensus. They increasingly ask for a ban on hydropower in the mountain region, as its unviability becomes apparent, and as no form of compensation can actually be commensurable to the losses. Movements and village residents make visible the contradictions of this ‘consensus of (energy) infrastructures’, claiming the loss of their sources of livelihood have not been compensated,

and perhaps never will. They also show how the hydropower industry has systematically violated laws and regulations and even adopted violent measures to repress the dissent.

In the Sawra Kuddu area, one young resident we interviewed was critical about the kind of employment hydropower offered in his area, and whom it benefits:

"Initially young people were positive about the dam. But those who eventually benefited were a handful of politically connected local contractors. I am aware of a few young people who were employed as labourers. Some got addicted to alcohol, some lost all their savings in futile entertainment. We have land here and apples in abundance. What they offered were only short-term jobs. Not much benefit for the valley."
Interview with a young taxi driver in the area of Sawra Kuddu HEP, April 2015

In the heavily impacted tribal district of Kinnaur and elsewhere in Satluj Basin, the affected communities responded with the slogan of "No-go zones for hydropower" and "*Kinnaur Bachao*" (Save Kinnaur), asserting their own visions of the future. They reclaim their right to the socio-ecological intergrity in that their territory be excluded from hydropower projects, that the remaining stretch of the Satluj can flow freely, that the ecological conditions for agriculture are preserved as it is their first source of livelihood, and that rights over water are safe-guarded. A firm rejection to hydropower was also found in the case of World Bank-backed Luhri HEP. Even when the company, Satluj Jal Vidyut Nigam Limited (SJVNL), opted for technical modification of the conflictive components to ease the protests, the

community continued to demand total scrapping of the project, eventually forcing the World Bank to withdraw its funds[32].

In tribal district Lahaul and Spiti, in a statement to the authorities two environment organisations affirm: “Sirs, we humbly submit before you that Lahaul is already a land on the path of spiritual, economic and ecological ‘development’ and ‘well-being’. What is required is to protect this land, its culture, its economy and its environment as it exists today. We will commit a huge crime if we put the Chenab river in tunnels, if we erect walls in its course, if we drill and blast the mountains by which it is surrounded and destabilise its slopes. These are no sweeping statements. This is the reality.”[33] In the same letter they state that: “this is not an ‘anti-development’ submission. In fact it is ‘pro-environment’ and ‘pro-people’ and hence, you will agree, it is ‘pro-development’. Because after all we all want ‘development’. Are we all not seeking a better life and ‘well-being’ for the whole society through this ‘development’?”

By employing these concepts, they also challenge the correlation between being “anti-development” and “anti-national” i.e. enemy of a deserved progress of the Indian nation, and reclaim democratic spaces for deciding what infrastructure and policies are in line with the ecological and cultural specificities of their territory. To do so, they also demand support for 'eco-tourism' related initiatives and for local cooperative-based mini hydropower projects, as an alternative economic plan to large-scale hydro. Their demands therefore are not only for more compensation, but they struggle for an

[32] More details on Luhri conflict: http://www.himdhara.org/2015/08/06/press-note-5th-august-2105-sjvn-changes-luhri-project-design-drops-tunnel-component-locals-relieved-demand-that-the-stretch-of-the-satluj-be-left-free-flowing/

[33] Abstract from a letter sent to The Environment Appraisal Committee, Ministry of Environment and Forests, GoI. Subject: Submission related to Chenab River and Lahaul Valley in context of EC for 430 MW Reoli Dugli project. The text of the letter is available here: https://sandrp.wordpress.com/2017/03/04/lahaul-people-write-to-environment-committee-not-to-clear-reoli-dugli-hydro-project/. Last accessed: 23.02.2018

epistemic turn in understanding what development is for them and ask "whose development" and energy "for whom and for what" (Ariza-Montobbio, 2015; Del Bene, et al. 2018b)?

These mobilised communities refuse to reorder their physical and geographical territories for energy plans that would compromise the material and also the cultural and religious premises of their dignified existence. It is within such spaces of questioning of large projects that we can find 'alternative' practices already in place, and indeed the ecological and social 'infrastructures' that actually *sustain* livelihoods and lives. Conflicts show important elements of alternative understanding of well-being, evolving critiques of 'imposed' development and the 're-ordering' of the territory. Rejecting not only one single hydro plant, for example, but taking a critical position on hydropower expansion in a wider valley indicates a reaction beyond NIMBY sentiments, thus laying the ground for a 'scaling up' and 'scaling out' of the opposition in a broader social spectrum and geographical scale (i.e. from smaller villages to a larger committees, but also inspiring resistances across other communities and localities). While at commodity extraction frontiers these lands are turned into marginalised sacrifice zones, mobilised groups struggle to keep them at the core of a healthy economy and vibrant cultural life.

In relation to local activism and the challenges it faces in such new scenarios, activists and village leaders identified some major issues. First, when hydroplants multiply and reach remote valleys, there are challenges of communicating with residents there, of exchanging knowledge such as concession procedures or rights to compensation, of coordinating proper

feasibility studies, of promoting community-led research in their territories, and of how to be properly informed about village hearings[34].

A second important challenge is engaging with the informal or contracted workers sector. The issue of workers rights is an emerging issue of contention. In Himachal in March 2015 workers of the Karcham-Wangtoo and Baspa II projects (earlier owned by the cement and energy giant Jai Prakash Ventures Limited, later sold off to Jindal Steel Works Private Limited) staged a joint protest at the construction site for 112 days demanding regularisation, fair and minimum wages, adequate housing facilities, safety conditions and fair implementation of the Factories Act.[35] This remains probably the biggest workers mobilisation around the hydro industry in the state, testifying to the gravity of the poor working conditions and creating potential spaces of alliance with a 'working class environmentalism' (Barca, 2012)?

We wish here also to acknowledge some limitation of our work, especially related to the difficult balance between ensuring ethnographic quality of in depth and embedded research and a representative quantitative spectrum of illustrative cases. First, we had limited capacity of traveling and reaching out to every location of resistance. There might be more places of contention around hydropower in Himachal as hundreds of projects are proposed, under construction or built, which could not be included in this chapter due to travel distances or for lack of local contacts. However, we built on the knowledge that our local partner developed throughout many years of action-research, and this holds for us as thorough and reliable representative data. Second, we did not explore in depth the reasons why hydropower in some cases is not

[34] For the Kuther dam, for example, local consultations have been carried out during a time of the year where local Gaddi shepherds and other groups were not there; for their livelihood, in fact, they move to lower grasslands during the winter months or are employed in some other activity.

[35] More details on: http://www.epw.in/journal/2015/18/reports-states-web-exclusives/kinnaurs-curse.html

highly conflictive (Dukpa, 2018); we believe that such an investigation goes beyond the scope of this study and needs a longer research time frame. Third, there are important differences *within* communities, across castes, classes, gender, age etc that could be inquired only partially in this article. Further work on these three issues would give a valuable contribution to studies on socio-ecological conflicts (over hydropower and beyond) in Himachal and the rest of the Himalayas.

El "por qué no te callas"
puede responderse muy facilmente:
"porqué estamos vivos"

Jaime Martínez Luna
"Eso que llaman comunalidad"

5. More dams, more violence? A global analysis on resistances and repression around conflictive dams through co-produced knowledge

Abstract

The present chapter analyses a unique database of 220 dam related environmental conflicts, retrieved from the Global Atlas on Environmental Justice (EJAtlas), and based on knowledge co-production between academics and activists[36]. Despite well-known controversial social and environmental impacts of dams, efforts to increase renewable energy generation have reinstated the interest into hydropower development globally. People affected by dams have largely denounced such 'unsustainabilities' through collective non-violent actions. Nevertheless, we found that repression, criminalization, violent targeting of activists and assassinations are recurrent features of conflictive dams. Violent repression is particularly high when indigenous people are involved. Indirect forms of violence are also analyzed through socio-economic, environmental, and health impacts. We argue that increasing repression of the opposition against unwanted energy infrastructures does not only serve to curb specific protest actions, but also aims to delegitimize and undermine differing understanding of sustainability, epistemologies, and world-views. This analysis cautions that allegedly sustainable renewables such as hydropower often replicates patterns of violence within a frame of an 'extractivism of renewables'. We finally suggest that co-production of knowledge between scientists, activists, and

[36] This chapter analyses the EJAtlas database of hydroelectric dams related conflicts as per February 2017. Since then, more cases have been added on the public online platform and are not included here.

communities should be largely encouraged in order to investigate sensitive and contentious topics in sustainability studies.

Keywords

Hydroelectric dams; violence; extractivism; ecological distribution conflicts; renewable energies; co-production of knowledge

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5.1 Introduction

"With the right commitments, better hydro will play an even greater role in delivering modern energy and water services in a climate-constrained world"
(Richard Taylor, CEO of International Hydropower Association), 2017)[37]

"Large hydro is a very big part of the solution for Africa and South Asia and Southeast Asia. I fundamentally believe we have to be involved,"
[The earlier move out of hydro] "was the wrong message. That was then. This is now. We are back."
(Rachel Kyte, World Bank, 2013)[38]

As affirmed above by the World Bank's vice president for sustainable development, the world economy's largest donor is now full swing back into large-scale hydro. Following a phase of greater caution towards hydropower from the early '90s due to its disruptive social and environmental impacts (Goldsmith and Hildyard, 1984), this move back to hydro is seen as a way to simultaneously reconcile the dual goals of carbon reduction and economic development.

The World Bank (WB) is not alone in this new wave of dam financing. New actors like pension- and insurance funds, the New Development Bank, and

[37] Statement at the World Hydropower Congress in Addis Ababa, 2017 - https://www.hydropower.org/news/date/201606

[38] "World Bank turns to hydropower to square development with climate change"; available at "https://www.washingtonpost.com/business/economy/world-bank-turns-to-hydropower-to-square-development-with-climate-change/2013/05/08/b9d60332-b1bd-11e2-9a98-4be1688d7d84_story.html

increasingly Chinese capital are today leading the global hydropower sector in terms of number and size of dams built, investment amounts, and geographical coverage (McDonald et al., 2009; Bosshard, 2009; International Rivers, 2012). Moreover, also climate funding, including the Clean Development Mechanism (CDM), and the Green Climate Fund (GCF, currently being negotiated), is especially interested in plants deemed to have less environmental impacts for their design and technology, like the Run-of-Rivers (RoR) schemes[39]. Hydro-electricity seems to turn again into a new point of consensus for low-carbon sustainable energy generation, the politics of development, green growth, and climate mitigation (Cole et al, 2014; Ahlers et al. 2015).

In 2017, the International Hydropower Association opened its congress with the slogan *"We Can Deliver Better Hydro"*. According to its CEO Richard Taylor, the hydro sector can improve and have a greater role to address climate and environmental concerns through improved governance, management, and technology.

However, the claim that hydropower can now address sustainability concerns is not reflected in the critical findings from the sustainability sciences. Renewable energy does not necessarily mean sustainable energy. A large body of scientific literature has documented the severe environmental and social impacts of dams (Fearnside 2016, 2004, 1999; Grumbine and Pandit, 2013; Sovacool and Bulan, 2013; WCD, 2000) as well as highlighted the limitations of dam impact assessments (Brismar, 2004; Erlewein, 2013; Fearnside, 2016). Moreover, all large-scale renewables require commonly large infrastructures or large amounts of land area (Scheidel and Sorman, 2012). As dams generally provide energy to industries and cities, and often

[39] https://cdm.unfccc.int/

support specific sectors with water and electricity, such as mining or agro-industries, they constitute a key element in the geographies of extractivism[40], capital accumulation, and growth-oriented economies (Yacoub et al. 2015).

Both large and smaller dams provoke social and environmental conflicts. Such conflicts are increasing as communities and groups organize in greater numbers to oppose undemocratic hydro infrastructure and the extractivist operations their energy feeds such as refineries, other industries, etc. (Martínez-Alier et al., 2010, Schlosberg, 2004; McCully 2001). Opposition to dams arises not only to denounce the social and ecological impacts and distress people suffer, but also to question the narrow techno-economic rationality that has shaped development policy and sustainability politics for decades (Goldman, 2001). In doing so, grassroots activists have contributed to pathways towards more sustainable energy provision by shedding light on the concerns and impacts of unsustainable resource uses (Scheidel et al, 2018) while actively aiming to transform them towards more sustainable outcomes (Temper et al., 2018).

At the same time, communities opposing dams increasingly face strong repression and violence. An emblematic example is the resistance against the Agua Zarca hydro plant, for which well-known activist Berta Caceres was killed in 2016 (EJAtlas 2016a). The UN Commission on Human Rights has weighed in recently on the critical situation of Environmental Human Rights Defenders (EHRDs) (OHCHR 2016, 2017), while UN special rapporteur on the rights of Indigenous Peoples, Victoria Tauli-Corpuz, stated in March

[40] The analytical term 'Extractivism' commonly looks at materials extracted from local territories and exported across national boundaries, commodity chains and global trade (Moore, 2000; Gudynas, 2016). Electricity did not originally fall under these analytical lenses, or only when it serves mining activities, mineral processing plants, etc. However, if extractivism is understood as a mode of accumulation (Acosta, 2013) through activities that "remove large quantities of natural resources" to be sent far away, we need to question the role of renewable energy infrastructures to extract electricity. More, hydro infrastructure also disrupts other natural resources like water in its specific ecological cycle, causes deforestation, mines rivers beds, etc... The hydropower extraction frontiers and entire riverbeds become sacrifice zones devoted to extraction and generation, thus creating forms of dependence and exclusion of a certain section of the society and economy.

2016 that "the pattern of killings in many countries (of EHRDs) is becoming an *epidemic*". At the UN 2016 General Assembly, the Special Rapporteur on the situation of human rights defenders Michel Forst expressed his concerns for the high violence against environmental defenders and acknowledged extractivist activities as a source of such violence and repression.

Given this grave and under-reported situation, this paper aims to address the issue of violence around dams. Violence and resource conflict is not a new topic in political ecology (Le Billon, 2014; Peluso and Watts, 2001) nor geography (Gregory and Pred, 2007; Springer, 2012; Springer and Le Billon, 2016). Other articles applied a political ecology lens to analyse data from the EJAtlas to discuss violence in environmetnal conflicts in Central America (Navas et al., 2018) and Venezuela (Teran, 2018). The novelty presented here includes the use of quantitative analysis to empirically establish the use of systemic violence to repress social opposition to dams. This points to a previously unexplored and concerning link between violence and renewable energies, particularly in an era of increasing renewable energy provision.

In this paper, we in turn aim to understand whether, through which forms, and against whom violence and repression is today replicating around one of the new frontiers of renewable energy carrier production, i.e. hydropower. To do so, we ask three basic questions: i) who are the protesters in conflictive projects? ii) what forms of mobilizations do they employ themselves? iii) what forms of violence and repression do they face? We shed light on the profiles of those who are mostly targeted by violent repression, illustrate how opposition is expressed, and how it is repressed.

Studying violence and repression beyond a case study approach is not straightforward. It is not part of ex-ante impact assessments; it is often

subjectively lived by those facing repression, but not necessarily publicly shared. Some forms of repression may also be subject to censorship and therefore not in the public eye. To address this challenge, we base our research on grounded knowledge, co-produced between academics and environmental justice organizations, which include empirical evidences, direct testimonies, published reports, academic papers documenting community's claims when faced with conflictive projects. We present an analysis of a unique database of 220 dam related environmental conflicts, registered in the Global Atlas of Environmental Justice - EJAtlas (Temper et al., 2015; Temper and Del Bene, 2016). To our knowledge, this is by far the largest database currently available on conflictive dams globally, constructed through co-produced knowledge.

Before presenting the results of our analysis, we briefly review the role of dams in relation to sustainability, as well as how the expansion of dams as renewable energy infrastructure is frequently justified by sustainability arguments, despite social opposition and corresponding violence (Section 5.2). Section 5.3 explains our methodology, the unique features as well as inherent limitations of a co-produced database, while Section 4 presents our results. We find that incidences of violence and repression are not uncommon in the establishment of large-dams and further that they disproportionately impact marginalized groups, such as indigenous peoples.

In the discussion section we highlight three main concerns and points of debate. We first suggest that co-production of knowledge should be largely encouraged in order to investigate sensitive topics in sustainability studies. Then, we argue that repression of the opposition against unwanted energy infrastructures does not only curb down specific protest actions, but also aims to delegitimate and undermine differing understanding of sustainability, epistemologies, and world-views. Worrying questions arise whether, where

and how, the renewed interest into hydropower replicates patterns of violence in the frame of an 'extractivism of renewables'. Third, restricting our analysis to only at direct physical episodes of violence would be inadequate, as such direct forms of physical violence occur within a larger context characterized by indirect forms of violence, which include forms of structural and cultural violence (Galtung 1969) as discussed in detail in Section 5.5.

With the new wave of investments in dams, we are concerned that also a new wave of violence is unfolding, as a deliberate strategy to make way for extractivist projects in an era of renewable energy provision.

5.2 Background

5.2.1 Dams and sustainability

As we have introduced above, dams are back on the global development agenda (IHA, 2017). Zarfl et al, (2014) estimated that currently at least 3,700 hydropower dams (>1MW) are either planned or already under construction globally. Ninety-three per cent of this increase in production will be provided by 847 large dams with a capacity of more than 100 MW each. Yet, dams are complex infrastructures and have triggered controversies between enthusiasts and sceptics for decades.

A vast literature addresses the severe environmental impacts dams generate at the local scale (Fearnside 2016, 2004, 1999; Grumbine and Pandit, 2013; Sovacool and Bulan, 2013). Scholars have also increasingly turned to implications of dam construction at regional and global scales. Examples include risks analysis for delta regions (Syvitski, 2008), hydrological alteration (Rosenberg et al., 2000) fragmentation of rivers (Zarfl et al., 2014),

and greenhouse emissions of large reservoirs (Fearnside and Pueyo, 2012). Such a global perspective becomes particular relevant when discussing the effects of climate finance and the actual impact of dams on reducing emissions. Erlewein and Nüsser (2011) provide an evidence-based critique of the implications of institutionalized policies, such as Clean Development Mechanism funding for RoR projects, and question their sustainability as a means of mitigation. Scholars and activists point out that CDM funding for dams, along with an emerging uncritical 'small is beautiful' ideology are contributing to a green-washing of dam construction companies under the new banner of 'sustainable hydro' (Erlewein and Nüsser, 2011; Haya and Payal, 2011; Pottinger, 2008).

Concerning social impacts assessments (SIAs) used to assess dam projects, Kirchherr and Charles (2016) identify their limitations in properly grasping the complexity of dam impacts. This is attributed to a limited spatial and temporal perspective and overlooking interlinkages between impacts due to the fact that SIAs focus on the communities located at the construction and the resettlement areas, within a defined geographical boundary. For example, for decades the main focus of attention was the resettlement process and the political implications it inevitably unleashes (Cernea, 1997; Dwivedi, 2002). Displacement however is a much more complex social distress, and plays out along broader spatial and temporal scales. Beside the spatial dimension, 'project reductionism' (Erlewein, 2013) is evidenced by the narrow temporal frame applied to SIAs, when impacts are analyzed during only one specific phase (i.e. construction). Scholars warn that this short-sighted approach becomes legally relevant as it misrecognizes the planning and designing stage (Plummer Braeckman and Guthrie, 2016), or even politically and strategically sensitive when hydro plants are located close to international borders (Kuenzer et al., 2013; Middleton, 2012). Lastly, several scholarly reviews have found the governance of many hydro projects inadequate,

leading to conflictive outcomes (Buechler et al., 2016; Kuenzer et al., 2013; Siciliano et al., 2016; Urban, 2014; Urban et al., 2015).

One of the most important and comprehensive studies on the controversial impacts of dams was published as early as 18 years ago. In 2000, the World Commission on Dams published its famous report, which on one side acknowledged the advancements in human welfare through dams and water resources management (in particular through multi-purpose dams for their role in water management and irrigation, flood control and electricity generation), but came to the conclusion that large dams are both socially unethical and environmentally unsustainable (WCD 2000). The global effort of the commission was only possible thanks to the participation of both technical experts in the sector and the affected communities, and is still considered the most respectable global study. The results were so 'damming' that the sector went through a lull for several years, and several investments from the World Bank and other big financial institutions and companies were withdrawn. Since then, academic studies have continued to problematize large dams, while at the same time a more integrated approach to dam planning and water resources management has been consolidating. Yet, one decade later, the cautions laid out in the WCD report seem to have been drowned out and forgotten in international development politics, amidst a new flurry of excitement and investment in large-scale hydropower (Cole et al, 2014; Ahlers et al. 2015).

5.2.2 Dams and violence

The issue of violence related to dams and contentious opposition to them has been less addressed in sustainability studies. We acknowledge that violence may take many different forms, and that the concept has been extended to include forms of violence that are not direct and physical. Here below we

touch on the relevant interpretations of violence with relation to environment and infrastructures.

Following Galtung's seminal contribution on the 'triangle of violence', which includes direct (physical), structural and cultural forms of violence (Galtung 1969), some authors have proposed complementary concepts for those contexts where violence is perpetrated especially through disruption of the environment. Paul Farmer (1996), for instance, contributed to the understanding of dam-induced displacement in Haiti in the 1960s as structural violence, by which social arrangements put individuals and populations in harm, and through which economically or historical processes constrain individual agency. Furthermore, Nixon (2011) proposed the concept of 'slow violence' to refer to environmental threats (climate change, desertification, etc) whose repercussions are dispersed across time and space and are therefore largely imperceptible and immune to rousing calls for action. 'Slow violence' becomes important to be considered when looking at the larger environmental and health impacts of dam projects. In relation to the territorial implications of large infrastructures, Rodgers and O'Neill (2012) have also discussed 'infrastructural violence' by looking at the role of infrastructures as the medium of structural violence and the place where power relations play out at the level of everyday practice. The authors draw on James Scott's suggestion that infrastructures are major vectors for the organization of society by the state (Scott 1998). These concepts and questions can be extended to the development of hydropower related infrastructure (dams, roads, power houses, transmission lines, etc) by asking, why do they become violent, for whom, under what conditions?

Direct violence (physical and intended to provoke physical harm) related to dam conflicts has been largely reported as domestic or motivated by communitarian/ethnic revenge, or a result of bad management of resettlement

procedures, or lack of due information to the impacted families (Becker and Vanclay, 2003). Only few studies have looked at direct violence against protesters, such as for instance an analysis of 93 protest campaigns against water projects, including dams, between 1971 and 1992, during the authoritarian regime in Indonesia, where "protestors suffered costs ranging from minor intimidation to murder in over one-fifth of the cases" (Aditjondro and Kowalewski, 1994). For the complexity of gathering reliable global data on violent repression of protests, and maybe also due to the limited capacity by researchers in reaching out to communities on the ground, this topic has generally been less analyzed.

However McCully's book Silenced Rivers (2001) and the World Commission on Dams (WCD) report both marked a watershed in addressing the issue of violence *against* dam opponents. While the WCD report is rather conservative in its language and data (McCully, 2001b), it exposed and warned about violent actions against dam critics due to repression by either the state or interested parties. "Populations affected or threatened by dams have fiercely resisted dam building throughout the last century. […] affected people's resistance to dams often went unnoticed internationally and, in some cases, the states concerned used intimidation and violence to suppress it" (WCD, 2000; p.18). The WCD illustrated this dynamic with examples such as the Kariba project between Zambia and Zimbabwe, the first WB-funded dam, where the colonial government in 1958 open fire on protesters, killing eight people and leaving 30 injured. (EJAtlas, 2015a). The commission recognized that "coercion and violence have been used against communities affected by dams" (WCD, 2000; p.218).

Both McCully's book and the WCD report relied on first hand data and testimonies from the ground up. The work of local groups, that we call here generally 'Environmental Justice Organizations' (EJOs), are often the main

testament to the systemic pattern of violence and violation of human rights related to dam projects. Organizations opposing dams formed as early as thirty years ago, such as the Narmada Bachao Andolan (NBA) in India, or the Movimento dos Atingidos por Barragens (MAB) in Brazil; while others came together more recently, like the Movimiento Rios Vivos in Colombia, or MAPDER in Mexico. They share a common goal in unveiling the impacts of dams, building on a critique put forward for the first time by Goldsmith and Hildyard in "The social and environmental effects of large dams" (1984), a book that helped launch an international anti-dam movement (McCully, 2001). Their collective stories were published in the International Dams Newsletters since late 1985 (later renamed World Rivers Review), coordinated by those who then formed International Rivers. As a result of this first phase of movements' cohesion, the 1997 Declaration of Curitiba demanded a "halt to all forms of violence and intimidation against people affected by dams and organizations opposing dams" during the First International Meeting of People Affected by Dams (Declaration of Curitiba, 1997).

During over three decades of exchange, mutual learning, and international campaigns, the locally grounded knowledge of the global anti-dam movement has produced unprecedented documentation on violations of human rights and violence (see for example Censat Agua Viva and Mining Watch Colombia 2009; CDDPH, 2010; Centro de Estudio para la Democracia 2016). Also research and advocacy groups such as Global Witness and Frontline Defenders have systematically collected evidences of repression and assassinations of environmental defenders, many of them connected to dam projects (Global Witness 2015, 2016; FLD 2016). The analysis of this paper relies therefore on knowledge co-production between activists and academics, as described in the next section.

5.3 Methodology: the EJAtlas, co-produced data sets, and proxies for violence and repression

Our analysis is based on a global dataset of 220 cases, taken from the Global Atlas of Environmental Justice (EJAtlas, see www.ejatlas.org). The general objective of the EJAtlas is to identify emblematic cases of opposition and mobilization against environmental injustices and ecological distribution conflicts (see Temper et al., 2015 for the overall methodology of data collection). Data for the entries were gathered together with local groups, independent researchers, scholars and journalists, within a framework of activist-led research and co-production of knowledge, according to their diverse and pluralist forms of knowing and with different grades of engagement (Brown, 1997; Fals-Borda, 1987; Jasanoff, 2004; Bremen and Meisch, 2017). As Escobar (2008) argues, these social movements are important spaces of knowledge production that do not only enact politics through protest and cultural contestation, but are generators or facilitators of diverse types of knowledge creation (see also Conde 2014, and Temper and Del Bene, 2016). Research using co-produced knowledge is generally based on single in-depth studies, as it is a time-consuming process between researchers, activists and/or affected people, but rarely draws on a comparison of a large number of cases. This paper is an attempt to do so, by providing new insights based on a global analysis.

To construct the EJatlas database specifically on dams, a total of around 100 collaborators were involved in a process that lasted over five years. They include leaders of relevant environmental organizations in their respective countries (e.g. Censat in Colombia, Accion Ecologica in Ecuador, MAB in Brazil, NAPM in India, etc), academic researchers and activist scholars, activists and community members in the affected areas. Most of them have

been contacted directly by the authors, or through snowball sampling. As a first step, conflicts were identified according to their relevance in the country and the actors involved. The focus has been on cases where mobilization started from the early '90s, but includes also a few historical cases (like Akosombo in Ghana or Sardar Sarovar dam in India, for their emblematic impacts).

In a second phase, data on the conflict were added into the EJAtlas through a form of over hundred fields, containing both qualitative and quantitative data (on both the conflict and the conflictive project). Data were then revised and moderated by the authors to ensure quality and exhaustiveness, and finally made public on the map and open to public extended peer-review and comments[41]. To further validate our data, and to find specific information on repression, we also count on 24 testimonies from social movements leaders and communities, transnational NGOs, scholars, and advocacy groups, collected across several countries in the last three years. Due to their sensitivity, we are unable to disclose their identities. The analysed 220 cases represent thus a purposive sample that focuses on conflictive dams, and which has been constructed based on expert knowledge and elicitation.

[41] For a more general description of the data gathering process, see also Temper et al., 2015

Figure 5.1: Global map showing the location of conflictive dam cases analysed in this paper. Note that a lower presence of cases does not necessarily mean there are no conflicts. The EJAtlas is a work in progress and add an avarage of one case per day. Coverage largely depends on availability of data and accessibility to local informants.

To inquire into direct forms of violence and repression, we base our analysis on the following outcomes reported in the EJAtlas form: Repression of the protest, Criminalization, Violent targeting of activists, and Deaths through murder (RCVD). *Repression* (R) includes forced subjugation of protest, dissent or demonstrations. *Criminalization* (C) refers to a wide range of falsified or distorted accusations to discredit activist (often social leaders, spokespersons or acknowledged authorities, women, etc), start legal cases against them. *Violent targeting* (V) of activists is understood as direct actions deliberately aimed at harassing, injuring or killing specific targeted persons, usually key activists. *Deaths through murders* (D) refer deaths of project opponents either as a consequence of repressive actions during protests or through deliberate assassinations.

To inquire into forms of indirect violence, we discuss the most reported impacts, both visible (where written proofs are available, or reliable eye

witnesses) and potential (with reasonable fear it could materialize for published technical reports, or for alarming signs of initial damage, for example) regarding environmental, socio-economic and health issues and discuss how they relate to other forms of violence beyond direct physical violence. The quantitative analysis presented is further complemented with qualitative, anecdotal information from specific cases and interviews.

Note that the sample presented by the EJAtlas has some inherent limitations. Global case coverage depends on collaborators willing to contribute to the EJAtlas. Hence, data availability is limited and the obtained sample, visualized in Figure 1, has an uneven geographical coverage. Therefore, no country comparisons can be made, but only basic conclusions across the total set of conflicts, and regarding broad geographical regions that are sufficiently mapped. As seen in Figure 1, the discussed cases are primarily concentrated in South and Southeast Asia, Central and South America, Balkans and Anatolia. Other regions like many African countries, China, and Russia have a lower number of cases because of our difficulty in getting information from these areas. Other regions such as North America and Europe also have fewer cases analyzed as many dam related conflicts there happened much earlier than the time period considered. Hence, while we do not claim this sample to be statistically representative at the global level, the number of 220 cases represents the largest empirical review on conflictive dams based on co-produced knowledge, available until today in the literature. Therefore, it can provide new important insights into the wide-ranging characteristics of conflictive dams.

5.4 Results: protester groups, resistance strategies and violence

We turn now to discussing the results of our analysis on the use of violence and repression across conflictive dams. At the outset, it should be noted that among the categories of industries the EJAtlas documents, including mining, nuclear, fossil fuels extraction etc., water management conflicts such as dams are among the most intense and conflictive, in terms of degree of mobilizations and violence involved (EJatlas, 2017). The following subsections provide the results of the quantitative analysis regarding the different opposing groups involved in these conflicts, their forms of mobilizations, and the different forms violence and repression they face.

5.4.1 Groups mobilized in dam conflicts

Figure 5.2 shows the frequency of diverse groups reported to be at the forefront of opposition. We subdivided the protester groups into four main categories: 1) local protesters, largely concerned about livelihood issues; 2) institutionalized and organized groups; 3) frequently discriminated groups and 4) other occasional groups. Note that these groups are not mutually exclusive, as protesters may share the characteristics of various groups (like e.g., indigenous farmers).

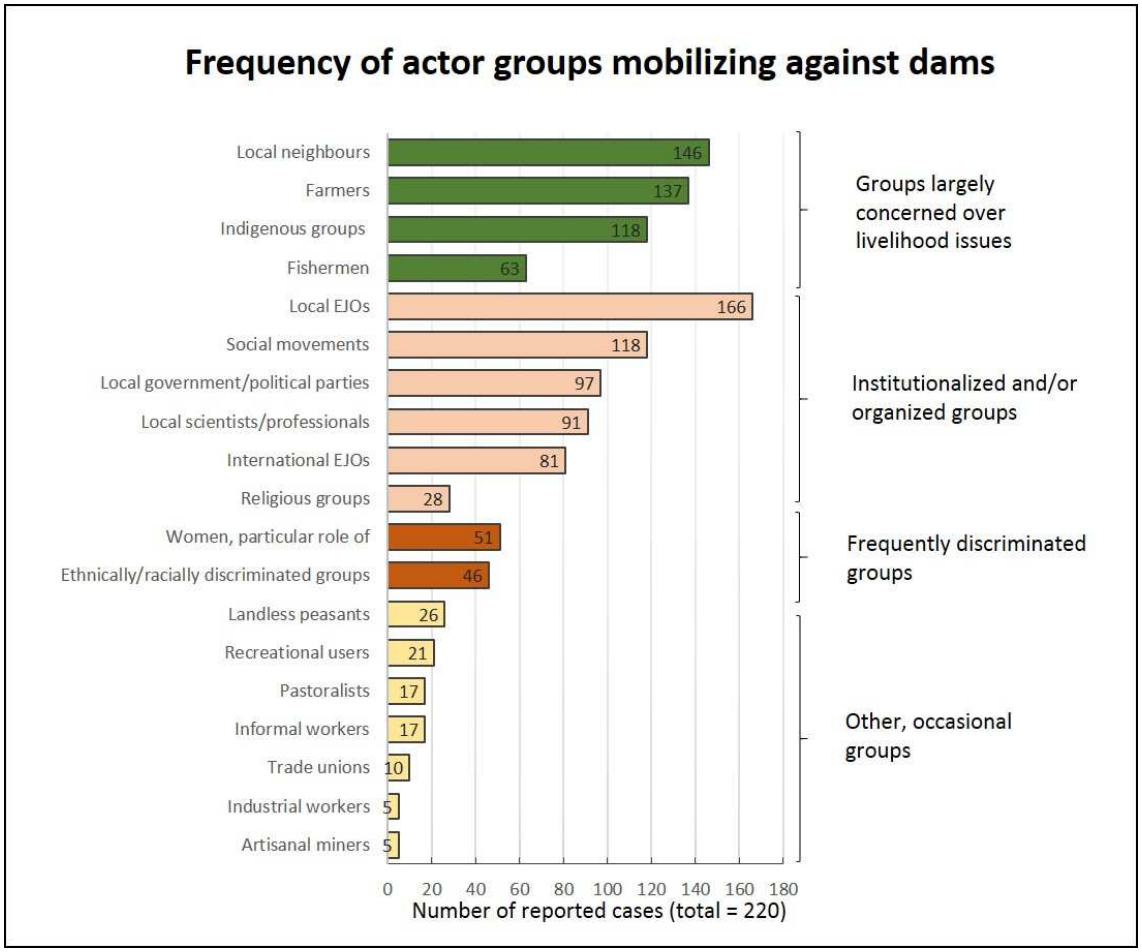

Figure 5.2: Frequency of actor groups mobilizing against dams. Source: own elaboration, based on a sample of 220 cases of conflictive dams, retrieved from the EJAtlas database. Categories are taken from the EJAtlas form. Note that categories are not mutually exclusive, i.e. one case commonly involves several groups, and individual protesters (e.g. an indigenous farmer) can belong to several groups.

In contentious activity related to dams, 'local groups largely concerned over livelihood issues' appear to be the ones that most mobilize. This category includes local neighbours, farmers, Indigenous communities and fishermen. They represent a manifestation of what Martínez-Alier (2002) calls the Environmentalism of the Poor, as hydroprojects have a severe and irreversible impact on their means of livelihood leading to their impoverishment.

The issue of loss of land and means of livelihood due to submergence is a key reason for farmers to mobilize, but they also do so to resist forced broader agrarian changes dams would bring along, including transformations of land

use patterns, transfers in land property, increased industrialization, etc. The 'water grab' (Franco et al., 2014) element in agrarian conflicts is often further aggravated by the submergence of riparian land with very rich nutrients, that represents a grave loss for local economies and subsistence. The Akosombo dam built by Impregilo in 1961 in Ghana, for example, flooded a huge area of the Volta River Basin (creating one of the largest man-made reservoirs, the Lake Volta) and displaced over 80,000 farmers, in the name of the largest development intervention in the country (McCully, 2001, EJAtlas 2016c). This inevitably leads to increased agrarian conflicts as a result of land shortage.

Indigenous communities are one of the most mobilized and impacted groups, due to the large amount of indigenous territories in old and new extraction frontiers of hydropower (Fearnside, 2015; Huber and Joshi, 2015). Almost all large dams in the Philippines were proposed or finally built on indigenous territory (WCD, 2000). In India, tribal people represent just 8% of the population but 40-50% of those displaced by dams and other development projects (Survival International, 2010). Indigenous peoples, along with fisherfolk and informal workers, are also the ones that have been mostly misrecognized by ESIAs, when not accounted for at all for lack of written entitlements, discrimination, racism, among other factors.

The category of 'Often discriminated groups' deserves a special note. They are usually not recognized as affected peoples, as they usually don't have written legal entitlements to land. We have discussed this already for fisherfolk above, but it is also particularly problematic for unmarried women or widows (and their children) (Interview with lead activist, December 2015. India). The impacts on their livelihoods remain overlooked and often uncompensated. In almost a quarter of all cases, women turn into leading figures in dam protests.

The graph shows a very high percentage of cases where communities have organized into collectives, social movements, local organizations, formal NGOs, etc (local EJOs and social movements). Such collectives represent an important social actor and are representative of what Martínez-Alier et al., (2016) call the global Environmental Justice Movement. This is in fact to be found across the five continents and with common demands, although with differences in terms of level of engagement and capacity of networking between organizations (higher in Latin America for example, lower in African countries).

The involvement of international organizations to support local protest is found in 81 out of the 220 cases. This figure is not high when we consider that the sample includes primarily the most contentious projects known internationally. This involvement is most prominent when international companies as well as finance institutions like the WB and other funders are involved, leading to coordinated actions between local groups and others located in the countries of origin of the investment. This figure is particularly relevant if we consider the recurrent efforts project proponents and governments make to criminalize protestors as foreign-led conspirants, 'anti-development' enemies who want to keep impoverished countries poor. This was for example the case for the NBA campaign in the Narmada valley in India to stop the Sardar Sarovar dam and other projects in the same basin (EJAtlas 2016d and EJAtlas 2016e). Other social movements (whose main activities might be related to other social justice issues such as health, education, housing), religious groups, local administrations and scientists are other important actors, which prove the broad scope of the resistance, and the plurality of concerns it mobilizes.

5.4.2 Action repertoires

Figure 5.3 shows the large repertoire of mobilization forms. We highlighted four main features that characterize them: non-violent and largely informal actions; actions that intervene in formal procedures; creation of alternative knowledge; actions with a potentially violent character.

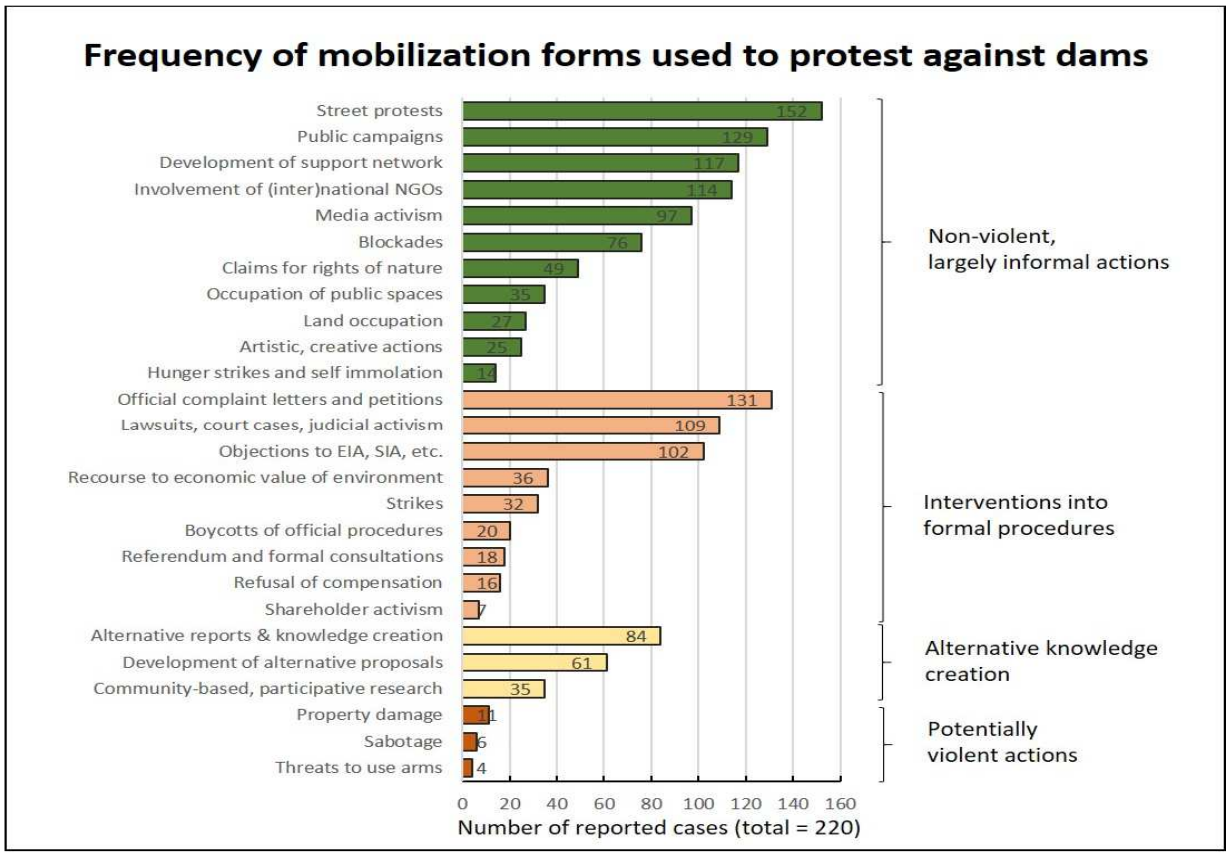

Figure 5.3 Frequency of mobilizations forms reported to be used to protest against dams. Source: own elaboration, based on a sample of 220 cases of conflictive dams, retrieved from the EJAtlas database. Categories of forms of mobilization are taken from the EJAtlas form.

According to the information on organized resistance we have access to[42], expressions of dissent and resistance are primarily non-violent and in the public domain (street marches, open petitions, artistic performances etc.). Violent actions remain extremely marginal. Nonviolent resistance also includes more disruptive actions where people have put their own bodies in

[42] Our database does not generally account for individual initiatives that fall outside a collective strategy of opposition, information to which we would not necessarily have access.

the frontline of resistance, i.e. during land occupations or blockades, which often happens when no other means prove effective or was heard. Similarly, hunger strikes and self-immolation (or threats thereof) were also adopted in a desperate effort of making one's claims recognized while at the same time not giving up to violence. Perhaps the most powerful and evocative protest action is the '*jal samarpan'*, taken by those whose homes were threatened to be submerged by the Narmada dams in India. Here, protesters have been staying in rising waters after the closure of dam gates and were ready to be drowned in the water if no action is taken in their favour (Baviskar, 1995). These extreme actions show the determination of not being wiped away by imposed megaprojects and the deep attachement to one's territory, and testify to the undemocratic character of dams related extractivism.

Beside direct resistance actions, anti-dam movements are increasingly building alliances with other sectors or social movements, broadening the scope of their construction of alternatives. This shows that opposition actions are not only confrontational, but increasingly propositional and proactive towards systemic changes. The Brazilian MAB is for example allying with trade unions in the *Plataforma Operária e Camponesa para Energia* (Workers' and Farmers' Platform for Energy)[43], to discuss the historical debt that megaprojects and energy corporations owe to those affected, and to draw-up their proposal for an energy and mining policy for the country (*Proyecto Energetico Popular*). Similarly, the Colombian Rios Vivos Movement is pushing for a *Modelo Social Minero-Energetico*, as an alternative agenda to the government's energy and mining policies. Such building of a support network, whereby organizations or NGOs at the national- and international level work together on a common agenda, is to be found in over 50% of the cases.

[43] See more at: http://www.mabnacional.org.br/category/tema/plataforma-oper-ria-e-camponesa-para-energia

Almost equally used are forms of political advocacy that intervene in official procedures, such as official petitions, the application of legal tools (both in national and international courts) to counteract flawed ESIAs, official compliance letters in order to defend affected peoples' rights and demand environmental regulations are judicially applied. Such type of action testifies to a high level of capacity and the knowledge necessary so as to be able to engage with what are often complicated and expensive procedures. It also demonstrates the high incidence of projects that are suspended or rights recognized via legal mechanisms, which suggests that projects are often pushed forward in not complete compliance with the law. Consultations and legal referenda have become increasingly important in some regions, especially in the indigenous territories of Latin America, where consent from the communities is recognized by national and international law (Convention 169 of ILO, the United Nations Declaration of the Rights of Indigenous Peoples, etc.), although not always enforced. Consultations have asked for the cancellation of projects such as the San Mateo Ixtatán dam in Mexico (EJAtlas 2017c), or the Corpus Christi dam, between Argentina and Paraguay (EJAtlas 2017i), which led to the scrapping of the project in 2014.

We observe that apart from confrontational actions and engagement with official procedures, mobilizers have also created spaces for alternative knowledge production. This includes reports and community-based participatory studies, for example to detect specific impacts, or to denounce repression against the communities. It also includes studies on the viability of energy alternatives and sustainable uses of natural resources, or spaces for community-based psychological assistance and rehabilitation (see further in the Discussion section).

5.4.3 Repression, criminalization, violent targeting, and assassination of dam opponents

Figure 5.4 shows the percentage of incidences of repression, criminalization, violence against activists and death through murder (RCVD) across the global database and where specifically indigenous populations are involved.

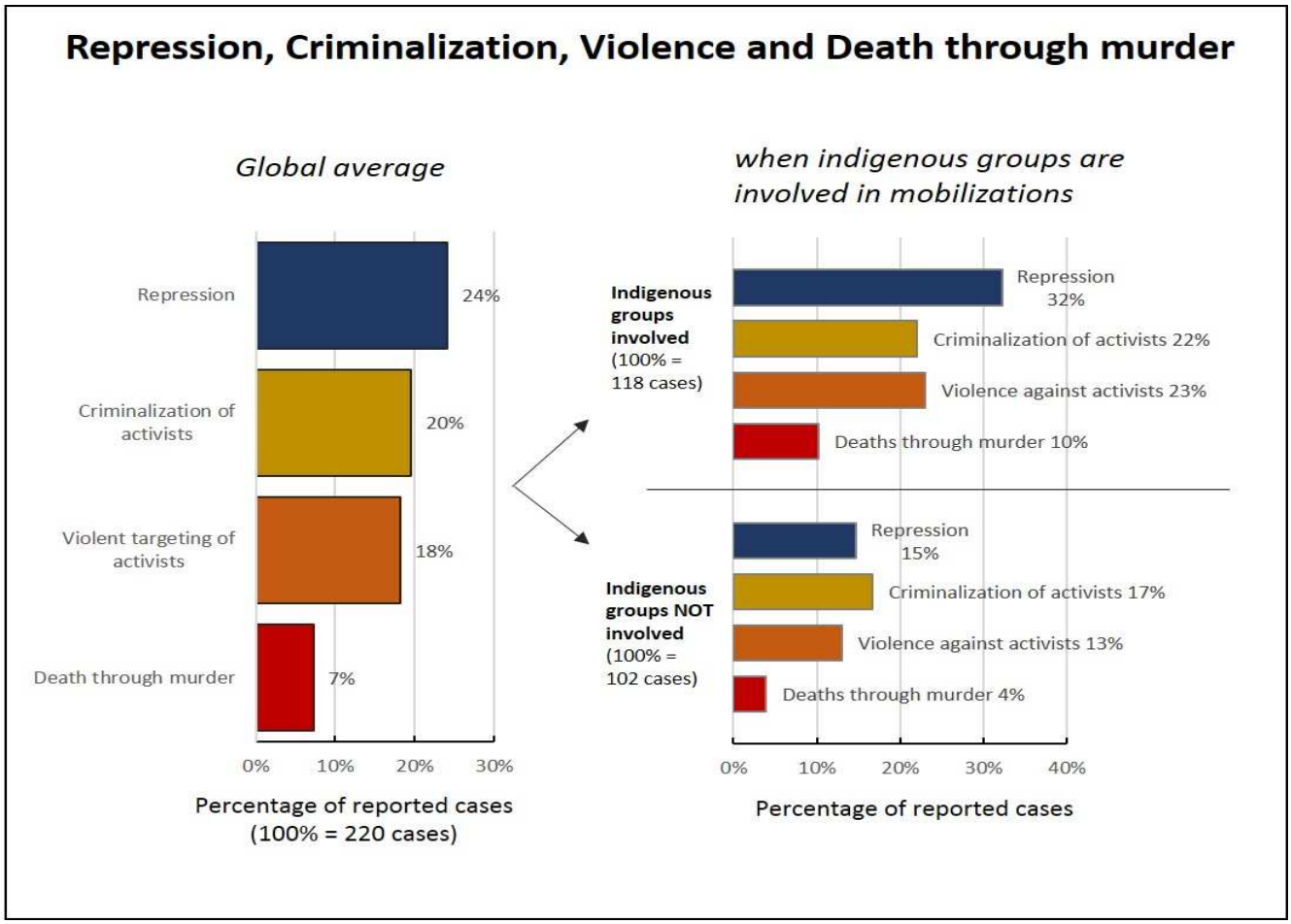

Figure 5.4 Rates of repression, criminalization, violence and death through murder, faced by protesters against dams. Source: own elaboration, based on a sample of 220 cases of conflictive dams, retrieved from the EJAtlas database. Indigenous groups were reported to be involved in mobilizations in 118 cases, out of the total sample of 220 cases. Categories are taken from the EJAtlas form.

Some stories from the ground may help to illustrate how incidences of RCVD manifest in practice, often in an interrelated way. *Repression* is a broad category that captures physical repression of dissent, either during protests and actions, but also through militarization of an area, police presence,

curfews, etc often targeting a whole community/group. The company Hidro Santa Rita in Guatemala is responsible for fostering repression and intimidation of communities along the Río Dolores (EJAtlas 2016h). In 2013 forced evictions started and arbitrary detentions were used to silence the opposition. The conflict escalated and in 2014 two teenagers lost their lives and many more were brutally attacked with machetes during a Catholic celebration. Despite this, the project received CDM funds that same year (ibid).

Criminalization was also found to be an extremely recurrent tool for discrediting and silencing dissent. It can occur through judicial means, such as lawsuits against activists and EHRDs, but also through the construction of discourses that aim to delegitimate project opponents, and their organizations. Governments often accuse them of being anti-national, anti-development or even terrorists, and therefore intimidate them. Private actors too may abuse the law against them, for example through defamation or libel lawsuits, or cases of property damage, trespassing, and the like. That way, powerful entities such as states and companies may place restrictions on civil society activities, while increasing the burden on activists with litigation costs and damages they may be unable to deal with and which curtail their capacity to organize. For example, in the case of El Quimbo dam in Colombia, leaders of ASOQUIMBO have been sued for strikes, land invasion, obstruction of roads, and personal injuries against police forces (EJAtlas, 2017a). However, in April 2017, the Supreme Court finally rejected similar accusation attributed by ENEL/ENDESA to two of the leaders (Interview with activist scholar, October 2016. Colombia)

The case of Margarito J. Cabal in the Philippines is evocative of the link between criminalization and *violent targeting* of leading activists and key personalities in the community/movement, sometimes carried out by the

police forces as well as through private security guards, or even hired assassins. Margarito was a member of the Save Pulangi Alliance, involved in the opposition to the Pulangi V hydroelectric project in Bukidnon province, which would submerge 22 villages, including indigenous peoples' land and small farms. The accusations against Margarito were accompanied by repression of the movements' meetings and threats to other members. In this context of highly conflictive and unpunished violence, Margarito finally lost his life in 2012 by the hands of two unknown men (EJAtlas, 2018e).

Our results show at least 20 cases where activists or opponents to dams were murdered either during peaceful actions, public demonstrations or at their own homes. In Mexico, the case of Noé Vasquez, an activist opposing the Naranjal project on the Rio Blanco (EJAtlas 2016g), triggered outrage in 2013, just before the opening ceremony of the 10th National Meeting of the Mexican network MAPDER, in the state of Veracruz. He was collecting flowers and plants in a nearby forest for a Xochitlalis ritual to thank Mother Earth and remember all the victims of extractivist projects, when he was shot dead. The murder of Berta Caceres and numerous indigenous activists related to the Agua Zarca project in Honduras (Centro de Estudio para la Democracia 2016; EJAtlas, 2016a) is another case in point that demonstrates the inter-connections between dam projects proponents, military elites and hired assassins, to get rid of uncomfortable movements' leaders[44].

Globally, repression appears to be the most recurrent tool for silencing opposition, followed by criminalization of activists, violently targeting them and assassinations. However, disaggregating the data into dam conflicts in which indigenous groups were involved in mobilizations (118 cases), and those they were not (102 cases), the way violence and repression are

[44] Evidences are reported by lead lawyers of the case, more details here: https://www.theguardian.com/world/2017/feb/28/berta-caceres-honduras-military-intelligence-us-trained-special-forces. Last accessed: 30.11.17

employed changes. While in non-indigenous territories, criminalization is the most recurrent form of curbing opposition, followed by repression, violent targeting and assassination; in indigenous territories, repression increases significantly (from 24% of cases in the global database, to 32%) and becomes the most frequent one, followed by violent targeting and criminalization. Incidences of assassination also increase to 10% of cases when indigenous communities are involved, compared to 4% when they are not. Note that one conflict case can have several victims.

This shows two important aspects. First, it demonstrates the higher level of direct violence present in indigenous territories, which have become important frontiers of dam construction. Second, the continuance of historical racism against indigenous communities as well as the impunity of crimes committed against them in a context of ongoing colonialism. Global Witness' database on environmental activists killed reflects this, with at least 47 of the 116 EHRDs killed globally in 2014 indigenous. In 2015, the number increased to 67 out of 185 (Global Witness, 2015). Moreover, indigenous peoples often face other severe challenges, linked with the failure of governments to recognize (collective) ownership rights vis-à-vis ancestral lands. Resulting legal ambiguities in turn facilitate labelling of activists as criminals when they resist unwanted projects (Interview with threatened movement organizer, November 2016. Mexico).

This data presents evidence to, on one hand, the wide array of territorial and social implications extractivist industries such as dams provoke, ranging from irreversible pollution and depletion of resources, to displacements, militarization, racism, division of communities and families, *machismo* and violence against women, to the wiping out of indigenous knowledge, among others. On the other, it also shows the political meaning of repression of protest. What these people represent for the movement and the nature of their

militancy shows that what is at dispute on the ground is not only the construction of a (dam) project, but also the delegitimization of dissent and differing political and life projects and understandings of sustainability (Escobar, 2008; 2014). The next section discusses the wider context in which violence and repression occurs, including forms of indirect violence.

5.4.4 Environmental, socio-economic and health related impacts

Violence cannot be understood solely as isolated episodes, which occur against individuals in an otherwise 'normal' environment. Assassinations, violence, repression and criminalization commonly happen in an already suffering environment, where resources are overexploited and their capacity for regeneration undermined. This section examines the most common environmental, socio-economic and health related impacts recorded in our database (Figure 5.5) so as to bring forward insights on the profound consequences of the hydro industry in an integral manner.

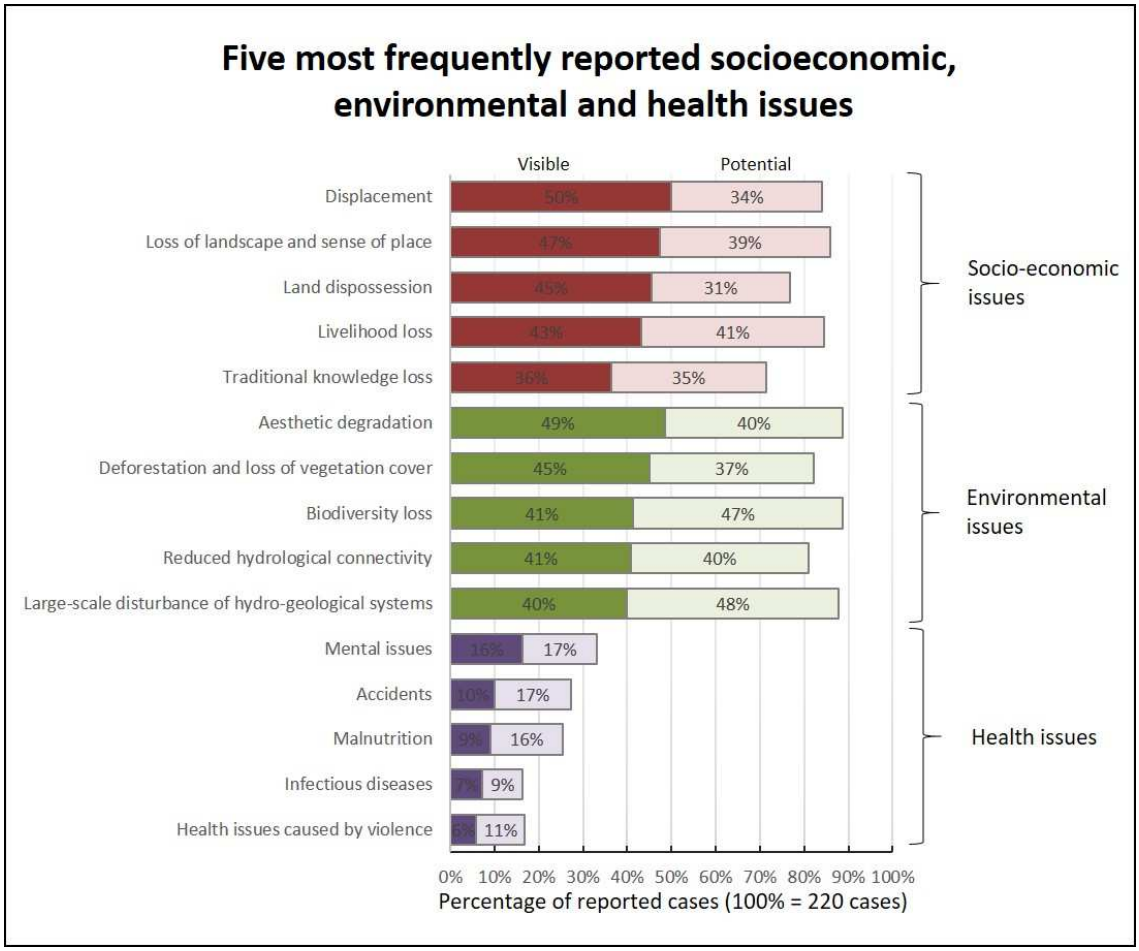

Figure 5.5 Five most frequently reported visible and potential socio-economic, environmental and health impacts, provoked by conflictive dams. Source: own elaboration, based on a sample of 220 cases of conflictive dams, retrieved from the EJAtlas database. Categories are taken from the EJAtlas form.

Of reported *socio-economic* impacts, the five most recurrent categories are 1) displacement, 2) loss of landscape and sense of place, 3) land dispossession, 4) loss of livelihood, and 5) loss of grounded traditional knowledge. Such impacts usually entail an important loss of grounded traditional knowledge. These are among the prime reasons people mobilize, as seen above in Section 4.1. In our sample, 38-50% of cases are already experiencing these impacts, termed visible, whereas in up to 70–85% of the cases these impacts are considered potential if the project goes through. Induced displacement, land dispossession or grabbing, and loss of livelihoods, might also happen long before the implementation of projects, when resistance is less intense (Interview with movements organizer,

October 2016. Colombia). However, as in the case of the Sardar Sarovar Dam along the Narmada, threats of submergence can be used as an illegal tool for forcing people to move against their will and against the law, even without providing a proper resettlement site for them (Interview with lead activists, April 2014. India)[45]. Forced evictions can also happen under violent circumstances whereby violations of human rights (understood here mainly *strictu sensu* as violation of personal freedom and integrity) are no exception.

The previously cited Kariba case is an eloquent example from the '50s, but forced evictions by paramilitary gangs also occured at Chixoy dam in Guatemala in the '80s (EJAtlas, 2015b); since 1989 over 40,000 Guaranís living on the border between Paraguay and Argentina were forcibly evicted to make way for the construction of the Yacyretà Dam (EJAtlas 2015c), including the burning down of houses, the flooding of farms and homes without prior notice. In Colombia, about 80,000 people have been evicted to make way for the Urrá and Hidroituango dams (EJAtlas, 2016b, EJAtlas, 2016e). Here, military and paramilitary forces are key actors of violence and forced evictions (Interview with community members, October 2016. Colombia). The movement Rios Vivos in Colombia and Censat Agua Viva, and Burma Rivers Network warn of the escalation of militarization as a tool for expansion of extractivist economies in such countries affected by internal armed conflicts, and in volatile ethnic borders regions (Censat Agua Viva and Mining Watch Canada, 2009).

Visible environmental impacts are reported for about 40% to 50% of the conflict cases, including some plants that are still under construction. Aesthetic degradation and loss of vegetation cover are the most observed,

[45] At the time of writing, over 40,000 families in the Narmada valley are under serious threat of drowning in the area of the Sardar Sarovar dam. Authorities are determined to close the gates despite resettlement being not fully done and infringing this way the orders of the Supreme Court.

while loss of biodiversity and disturbance of hydrology are also common direct consequences. This percentage rises to 80% to 90% if we count also the cases where these impacts are deemed as potential. Deterioration of the environment, be it due to visible disasters and events, or through much slower processes of degradation of river- and adjunct ecosystems, may affect the basis of livelihoods and the health of many communities over the long-term (Interview with NGO affiliated ecologist, October 2016. Georgia). This issue can be understood as a form of 'slow violence' (Nixon, 2011; Holterman, 2014) that local communities face. As we showed above (Figure 2), these are among the groups that most mobilize.

Health implications should also receive high attention. Although the percentage of cases with visible (between 7% and 17%) and potential impacts (20% to 32%) are lower, such impacts show the degree to which such projects disrupt and harm local communities. High levels of psychic disorders and stress, for example, have often been observed around dam construction, which can lead to depression and extreme actions such as suicide. In Chile, the tragedy of the Biobio river is a case in point, and sadly described as a "robbery of the soul"[46]. At the beginning of the '90s, soon after the Pinochet dictatorship, the company Endesa was planning to dam 180km of river flow with six hydro plants in the Alto Bío Bío region. After a 7 year-long resistance of local Pehuenche indigenous communities, environmental groups and scientists, the company could only manage to build two, Ralco and Pengue (EJAtlas 2016f). However, it left behind 4,000 km^2 of forests inundated and destroyed. This region now has the highest rate of depression and suicide of the whole country, aggravated by a high rate of deforestation and industrial plantation, industry and contamination, and new hydro projects like Angostura (EJAtlas 2017b). This case is one example of how widespread

[46] Full testimony of Chilean ecologist and Right Livelihood awarded Juan Pablo Orrego can be found here: http://blogs.cooperativa.cl/opinion/medio-ambiente/20120719181008/alto-bio-bio-el-robo-del-alma/

persecution and severe degradation of the territory can lead to psychological disorders, severe anxiety and depression.

Figure 5.6 Noé Vasquez, was shot dead in 2013, just before the opening ceremony of the 10th National Meeting of the Mexican network MAPDER, in the state of Veracruz. He was collecting flowers and plants in a nearby forest for the opening *mistica*.

5.5 Discussion

This paper has analyzed 220 cases of civil society mobilizations against dams and responses to them. This represents the first quantitative analysis of its kind to shed light on the nature and shape of dam conflicts, including the actors mobilizing; the social, environmental and health impacts that motivate their opposition, the forms their mobilization takes and state and corporate responses to their contention.

5.5.1 Systemic repression

We have shown that many hydropower projects are highly conflictive, and

most significantly that opposition to these projects is routinely repressed with violence. While the social and environmental costs of dams themselves have been amply documented and are meant to be captured through ESIAs for individual projects, this paper provides empirical evidence of the often hidden but systemic crimes related to conflicts over dams themselves, establishing the high levels of violence and repression that are often entailed in pushing through such projects.

While such patterns of violence and militarization have been well documented as a key feature of extractivist projects, for example by Peluso and Watts (2001) for oil, what we show here is that such forms of repression, criminalization, violent targeting and assassinations employed against activists are also common features in the establishment of supposedly "sustainable" large-scale renewable infrastructures.

Given the extent of direct and indirect violence for conflictive dams presented, and the fact that these cases are not restricted only to countries under dictatorships and corrupted regimes, but are prevalent in democracies, as seen for example in Brazil (Milanez, 2015) India (Amnesty International India 2017) and France (Ejatlas, 2014), the data suggests that such repression and violence cannot be considered as rare cases of bad management but that such incidences are a systemic practice.

In non-Indigenous territories, criminalization of individuals or organizations and movements appears to be the first strategy to curb down dissent. However, in Indigenous territories, repression of protest actions or other forms of dissent becomes the most frequent one. Is this due to the dangerous condition where the abundance of unexploited natural resources, state and

corporate impunity, and historical racism continue to replicate conditions of colonialism?

Violence and repression appear to be a deliberate strategy for 're-ordering the territory' to make way for megaprojects (Ceceña, 2009). Such violence occurs in an atmosphere of impunity through the 'othering of local communities' and the framing of extractivist plans as necessary by governments and companies and executed by military and paramilitary (Escobar, 2004; Andreucci and Kallis, 2017).

Renewable projects, despite the claims of being carbon neutral and green, form very much part of the 'epidemic' UN expert Victoria Tauli-Corpuz talks about, in the economic and energy model of extractivism and mega-infrastructures. This leads us to suggest that large-scale dams can be considered a form of what might call 'renewables extractivism'. Sustainability studies are urged therefore to inquiry more in depth into how violence, repression and criminalization of dissent operate as deliberate tools to delegitimize different views and to impede *transformations* to and *protection* of sustainabilities.

5.5.2 Pluralist worlds and other sustainabilities

Our emphasis in this paper has been on the more direct and visceral forms of physical violence, however it is clear that such repression and violence have to be understood within the broader context of indirect forms of violence, including the severe ecological, socio-economic and health impacts presented which undermine livelihoods and ecologies, also termed 'slow violence' (Nixon, 2000). Resistance against dams by local communities, often together with other environmental justice organizations, political

bodies, scientists, exposes the incompatibility of extractivist projects with the cultural and spiritual reference systems embodied in the territory.

If we take seriously the assertion that conflicts are a space where transformative alternatives may take shape (Scheidel et al., 2018; Temper et al., 2018), it becomes apparent that as violent repression targets resistance, it also undermines the emergence of alternative visions, epistemologies, world-views, the '*pluriverse'* (Escobar, 2008, 2017; Shrivastava and Kothari, 2012). This silencing of other ways of being and other understandings of sustainability has led activists to term this sort of repression as 'extractivist violence'[47].

The manifestation of extractivist violence in renewable energy projects highlights the need for further debate on the social impacts of 'transitions towards sustainability', and particularly of renewable energies (Avila-Calero, 2018), and on what sustainability actually *means*, what it is supposed to actually *sustain*. If we consider the communities opposing dams not as protestors but as *protectors* of other life sources and ways of life, we would see in them embodied witnesses of other understanding of sustainability.

Anti-dam movements are creating collective visions on the type of energy model needed, energy for what, and controlled by whom. The Declaration of Temaca (2010), born out of the third international meeting of anti-dam movements in Mexico, for example, recognizes that resistance, protection and reconstruction (e.g., of local community-run energy generation plants, water harvesting and sanitation infrastructures, etc.) must go together. More

[47] In December 2016, anti-extractivist networks launched an open online petition to the Ecuadorian government to call for stopping violent repression against the Shuar indigenous group in the Amazon and the persecution of the organization Acción Ecologica[47]. The petition called this "extractivist violence", to expose the strict connection of repression with the material extraction model. The petition can be found here: http://movimientom4.org/2016/12/urgent-action-to-stop-double-persecution-against-shuar-communities-and-accion-ecologica-ecuador/

initiatives to define forms of 'energy sovereignty' are under discussion in many countries, from Colombia (Movement Rios Vivos) to the USA (Trade Unions for Energy Democracy), from Germany (Energiewende) to Brazil (Movimento de Atengidos por Barragens), from India (Energy Vikalp Sangam) to Spain (Xarxa pr la Sobirania Energetica), and address both the rejection of specific projects and energy models and the construction of different economic and social bonds.

This suggests that the making of a global or globalizing (Sikor and Newell, 2014) environmental justice movement around dams is happening not only across sectors but also across scales and countries, in a process we can call of *scaling out*, i.e. reaching out to and inspiring other similar movements.

5.5.3 Co-produced knowledge for transformation

The renewed interest in hydropower leads to concerns about a potential increase in the number and intensity of violent instances related to large-scale renewables as a panacea to the energy and climate crisis. Roadmaps for energy transition are urgent, but they cannot replicate the same system of political, technological, and epistemological control of the fossil fuels based economy. The design and evaluation of these new scenarios in turn require co-production of knowledge between academics, activists and affected people.

Environmental justice struggles are a place where colliding visions and understanding of life, economy, democracy, etc. confront each other (Escobar 2008). They are also a space of production between different forms of knowledge, in what is often called 'citizen science'. This research is founded in the recognition of social movements not as objects to be studied yet as creators of knowledge, often born out of struggles. Restoring their

agency to set priorities in research agendas contributes what has been termed epistemic or cognitive justice (Grosfoguel, 2016*)*. Such an approach involves going beyond research questions such as how to assess impacts, or how to facilitate a transition to renewable energies, to new understandings of what energy, water management, violence, security, sovereignty or democracy mean to diverse communities *(*Hildyard et al*.,* 2012; XSE, 2018*)*.

The EJAtlas is a product of such an effort that allows the gathering of information that otherwise remains invisible (Temper and Del Bene, 2016; Temper et. al., 2018). However, we recognize that the challenge is huge and that this database cannot be considered exhaustive. Many territories and resisting communities still remain in the shadow. Their stories finally get to the press only when known leading activists are murdered. How many other stories remain untold, invisibilized? In how many more ways violence unfolds and is experienced? What impacts will violence leave behind on the ground, which is not captured by any report, any press or scientific article?

Research requires new forms of engagement between researchers by profession (academics) and those who embody such grounded knowledge. How to pursue a robust scientific research, while at the same time acknowledging sensibilities and sensitive information? How to co-design and be active part of an engaged research throughout the process, even when timings can differ or different priorities being set (Temper and Del Bene, 2016)? How not only to co-produce, but also co-learn, co-comunicate, and co-benefit? How, for example, shall scholars disseminate results beyond academic journals, in order to be influential or put pressure to governments, corporations, courts, as well as being relevant for marginalized and less accessible communities. Will this process finally challenge power structures in research production and respond to the call for ‘utopian approach’ in research methodology (Bell and Phal, 2018)?

A new political engagement of academic scholarship urgently needs to deal with the growing global repression against environmental defenders, the high complexity in knowledge production around sensitive topics, and ethical issues in activist scholarship. It thus remains of key importance to further explore visions of sustainability that do not only commit to meet technical requirements in human-led intervention upon the environment, but whose objective is to sustain *other* 'life projects' (Escobar, 1995), that might respond to different world-visions and epistemologies (de Sousa Santos, 2014) and use different valuation languages and indicators (Martínez-Alier et al., 2010). Sustainability studies are urged therefore to inquiry more in depth into how violence, repression and criminalization of dissent operate as deliberate tools to delegitimize different views and to impede *transformations* to and *protection* of sustainabilities.

5.6 Conclusion

Despite well-known controversial social and environmental impacts of dams, efforts to increase renewable energy generation have reinstated the interest into hydropower development globally. People affected by dams have largely denounced such 'unsustainabilities', yet in doing so, they are faced with violence and repression that usually remains invisible in impact assessments and less addressed in academic studies. We find that the resistance normally takes non-violence action and is not only defensive but also propositive.

Despite that, repression, criminalization, violent targeting of activists and assassinations are recurrent features of conflictive dams. Violent repression is particularly high when indigenous people are involved. Indirect forms of

violence are also analyzed through socio-economic, environmental, and health impacts.

Worrying questions arise whether, where and how, the renewed interest into hydropower replicates patterns of violence in the frame of an ‘extractivism of renewables’. Second, we suggest that violence targets not only opposition, but also curbs down the emergence of alternative visions and a pluralist worldview, what is also termed ‘extractivist violence’. Third, we argue that co-production of knowledge should be largely encouraged in order to investigate sensitive topics in sustainability studies.

Necesitamos una pedagogía de la vincularidad,
que coloque al arraigo local y comunitario
en el centro de la vida.

Gustavo Castro Soto,
Intervention at ECSB conference in Chapecó 2016

6. Transformative anti-dam movements. Resisting mega-projects for an energy sovereignty project

Abstract

This chapter discusses emerging and consolidating perspectives of anti-dam movements in response to dams and hydropower expansion globally and the uneven power relations that underpin it. The research is informed by interviews and data collected among multiple anti-dam movements and collectives in Latin America, such as the Movimento dos Atingidos por Barragem (MAB) in Brazil and Movimiento Rios Vivos of Colombia, the Narmada Bachao Andolan (NBA) and Himdhara in India. It first shows that as governments and corporations promote hydropower as a key renewable and sustainable solution to climate change, grassroot Environmental Justice Organizations and transnational networks contribute to expose dam-induced land, water and energy grabbing. Then, the article discusses emerging multi-dimensional transformation forces in anti-dam struggles: 1) the emphasis on the nexus between land, water and energy in resistance; 2) the broadening of the recognition and understanding of different types of impacts; 3) the epistemic struggle for a pluralistic understanding of resources such as land, water and energy. The article finally introduces energy sovereignty (or, in some contexts, energy democracy) as a concept increasingly adopted by movements from which to stand, act and think about new forms of people's sovereignty and 'territorialities' to counter dispossession. The chapter suggests that anti-dam movements are increasingly leading to a process of transformation at multiple scales, as 'weavers of new forms of sovereignties', across sectors, through broader alliances and pluralist ontologies.

Keywords

Anti-dam resistance, hydropower, grabbing, energy sovereignty, transformations

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6.1 Introduction

"Our collective and individual responsibility is to secure water availability [...] To achieve this, we need human genius combined with permanent innovation. Tomorrow, with the development of technologies, we will pump deeper, transfer water further, adopt more sustainable treatments and purify water more efficiently.

[...] Global water security is now part of the National Security and the foreign policy of every country. We therefore need to set up a real hydrodiplomacy, which can be defined as the art to build peace around this vital resource."

Mr. Loïc FAUCHON, Honorary President of the World Water Council

The quote above comes from the opening ceremony of the 8th World Water Forum (hereafter WWF) held in Brasilia in March 2018. The largest international meeting on water related issues, initiated by the World Bank and corporate counterparts in 1997, once again confirms its commitment in dealing with increasingly urgent global threats to water sources through technological innovation and strong public-private partnerships, improved efficiency and global governance, including a "real hydrodiplomacy" capable

of building peace and preventing conflicts. Fauchon's words were echoed by a representative of the WWF host country, Percy Soares, of the Brazilian National Confederation of Industry, who included a recommendation for a correction in pricing: "Water should be more valued, and this means not only increasing its price, but rather working on strategies within companies".

Technological innovation, pricing, global governance and private financing are thus presented as the winning solutions to water crises and depletion. However, social movements and Environmental Justice Organizations (hereafter, EJOs) counter such statements by advancing a different people's agenda. Gathered in the same city but in the parallel Alternative World Water Forum (AWWF), EJOs created a space for engaging with the many ongoing struggles around water globally, for thinking of and planning common strategies, and for defending water and sanitation as a basic human right, as recognized by the United Nation Resolution 64/292 in 2010[48]. "Water is life, health, food, territory, human right, sacred commons", the AWWF declaration affirmed[49].

Both in the AWWF and World Water Forum, the nexus between water and energy emerged as a tense space of disputes. Social movements and EJOs denounced privatisation crusades of the current Brazilian government and other neoliberal countries, and condemned the increase of violence and repression against opponents of large dams and water transfers (Del Bene et al. 2018; see also Chapter Five of this thesis), the overexploitation of water for extractivist projects, mining, agribusiness and other industries.

[48] The final declaration of the AWWF can be found here: http://fama2018.org/2018/03/22/declaracao-final-do-fama-reafirma-agua-nao-e-mercadoria-agua-e-do-povo/ and a statement from the European Water Movement can be found here: http://europeanwater.org/it/news/press-releases/789-european-water-movement-statement-from-fama-in-brasilia

[49] My translation. The original writes" Água é vida, é saúde, é alimento, é território, é direito humano, é um bem comum sagrado."

Companies and the hydropower industry see water as an opportunity for business expansion and depict themselves as part of a solution to both ensuring green energy provision and to prevent water scarcity (IHA, 2017). In the words of the CEO of the International Hydropower Association, "Hydropower is part of the solution to the challenge of sustainable development, including the urgent need to provide people in developing countries with affordable, clean energy and water services. Hydropower reduces the world's reliance on fossil fuels, supporting variable renewables [...]". The recently signed Sustainable Water and Energy Solutions partnership initiative [50] between ITAIPU Binacional, developer of the transboundary plant of Itaipu between Brazil and Paraguay, and the UN agency Department of Economic and Social Affairs, calls to "further strengthen capacity building for effective and sustainable water and energy solution for all". This leaves little doubt as to the direction such solutions are aiming towards. Large infrastructures and a global governance of the water-energy nexus in the hands of public-private partnerships confirm to be up in the agenda, supported by the belief that the private actor performs more efficiently.

To legitimize their operations, companies and institutions increasingly appeal to the 2030 Agenda for Sustainable Development, which includes an ambitious vision that aims to "transform our world" (UN, 2015). Sustainable Development Goals six, seven and nine respectively aim for the protection of water-related ecosystems, access to affordable, reliable, sustainable and modern energy for all, and resilient infrastructures for an inclusive industrialization, economic development and human well-being. Moreover, the urgency for actions to tackle the climatic chaos set by the Paris agreement further pushes for substantial policies in this direction.

[50] UN DESA website - New partnership to explore sustainable water and energy solutions. 7 March 2018 https://www.un.org/development/desa/en/news/sustainable/water-energy-solutions-partnership.html

However, the many ecological conflicts that have arisen and are currently unfolding around large water and energy related infrastructures unveil the contradictions and tensions between differing visions around what it means to "transform our world". While governments and the corporate sector are building a global consensus on the need to increase the installed potential of renewable energy to tackle climate change, they are actually increasing energy generation from almost all sources and replicating a top-down model of energy generation and water management based on megaprojects and centrally-controlled infrastructures and transmission network. This counters the claims and demands of organized communities and EJOs, who find themselves at the frontlines of processes of dispossession and disruption of their ecosystems, homes and livelihoods.

So, urgent questions emerge, such as what is actually 'transformed' in our world, who transforms it and why, and in which direction? More specific in the field of the water and energy nexus, and in particular concerning hydropower, what transformations are actually at stake and competing in conflicts? This article aims to address these questions by looking at those struggles around hydropower projects and at the communities, movements, and transnational networks involved in resistance. Their resistance is increasingly organizing not only around the opposition to specific dams, but also around the overarching and large-scale disruption of systemic land, water and energy grabbing due to dams. In response, the slogan of 'energy sovereignty' is increasingly being adopted to reclaim people's control over energy sources, and to denounce social and ecological injustice. This move marks an important shift for understanding how struggles around hydro dams, which have been unfolding for more than 30 years now, are increasingly informing and shaping what we can call a 'transformative' type of resistance, which not only oppose specific hydropower plants, but which

actually create and perform alternatives and counter-practices, and more socially and ecologically arrangements. This article adopts an environmental justice perspective and the lens of the political ecology of dams for analyzing and making sense of such a type of resistance, which is increasingly globalizing, expanding and becoming 'radical' (Shrivastava and Kothari, 2012).

In the following section, the methods and sources are presented. Then, clarifications about the conceptual framework employed are provided. Third, some major processes of land, water and energy grabbing in relation to dams and hydropower are outlined. Fourth, three-fold transformative forces within anti-dam movements and EJOs are discussed, such as 1) the strengthening of linkages between the struggle for food and energy sovereignty and water justice, thus contributing to a cross-sectoral environmental justice movement; 2) the questioning and broadening of the concept of 'affected people', going beyond the locality of impacts; 3) the contribution to a pluralistic understanding of land, water and energy, and eventually of the territory, and thus to an epistemic struggle in the resistance.

The final discussion section suggests that over recent decades anti-dam movements have developed a transformative potential through weaving together plural sovereignties and through leadership towards new socio-metabolic configurations, able to question large development paradigms, to defend pluralistic ontologies, and to thus generate new understandings of sustainability.

6.2 Methods

This chapter is based on observations and reflections upon the politics and discourses of anti-dam movements in multiple locations and countries for at least ten years. The author visited the dam-affected valley of the Narmada river in India for the first time in 2007, where she first met activists and mobilized families in the Narmada Bachao Andolan movement. Three more visits followed, and included participation in demonstrations, rallies, sit-ins (*dharnas*), meetings with newly affected communities, and multiple visits to areas which have been affected by multiple dams for a long time[51]. Between 2010 and 2016 the author made multiple visits to movements and affected areas in the Himalayan states of Uttarakhand and Himachal Pradesh, and in the areas of the Tehri dam and Sawra-Kuddu dam. Additional interviews and field notes were taken at the India Rivers Week in Delhi in 2014, where experts from various fields of river basin management and activists gathered together to discuss politics and policies on rivers[52].

For research in Latin America and with Latin American movements, the author revised documents and declarations from a series of international seminars on "Transition to a People's Energy Project" ("*Transición para un Proyecto Energético Popular*"), with the title "Food, Water and Energy are not commodities" ("*Alimento, Água e Energia não são mercadorias*"). The first one was in Bilbao (Basque Country, Spain), in October 2013, which was

[51] The valley of the Narmada river is undergoing a drastic disruption of its ecology, due to a complex construction plan of around 30 very large dams, 135 medium size, and over 3,000 smaller dams along the Narmada and its tributaries. The probably most known project, inaugurated by PM N.Modi in 2017, is the Sardar Sarovar Project. If completed, the Narmada Valley Development Plan will basically turn the rivers into a series of lakes. The total number of displaced people is difficult to calculate for the unprecedented magnitude of the project and for doubtful commitment of the government to embark into such effort. A recent Fact Finding Report (2015) calculated the number of displaced families only by the SSP at over 48,000 (with an average of 5 people per family).

[52] News and proceedings can be found here: https://www.internationalrivers.org/blogs/328-9

also attended by the author. The second and third ones took place in Newark (USA) in March 2017 and Rio de Janeiro in October 2017, during the MAB 8th National Meeting. In 2016, the author attended the public launch of the *Movimiento Anti Represas* (MAR), a confluence of political platforms of anti-dam movements across Latin America and Central America. The launch and public representation of the new political subject happened during the IV Meeting on Social Sciences and Dams in Brazil, in the Universidade Federal da Fronteira Sul (UFFS)**,** in the campus of Chapeco[53]. Representatives of twelve countries came together in the meeting, and offered their respective positioning and diagnosis on the expansion of hydropower in their territories. In this chapter, the author analyses notes from the public event and from individual interviews with the representatives. The program of the event also included a three-day visit to dam-affected people and rehabilitation villages, as well as agroecology projects and educational training for youths initiated by the Brazilian Movimentos dos Atingidos por Barragens. The research stay in Brazil concluded with interviews to trade unions of the electricity sector and of the oil sector, as well as one pioneering urban household energy project in São Paulo.

Further research was conducted at an international meeting of activists convened by the organization International Rivers in Tbilisi, in April 2017[54]. A five-day program in the capital of Georgia gathered around 100 representatives of about 30 countries to discuss the current international political conjuncture and historical process, in relation to dams development, large renewables expansions, and state-of-the-art studies on impacts, displacements, alternative proposals and policies. The research stay in Georgia included a three-day visit to the Svaneti mountain region close to the

[53] IV Encontro Internacional Ciências Sociais e Barragens took place at the Universidade Federal da Fronteira Sul (UFFS) in September 2016. http://www.ecsb.com.br/

[54] https://bankwatch.org/event/river-gathering-georgia-2017

Russian border, where new hydroelectric projects are now under construction and where communities had just started mobilizing. This article is based on meeting notes and on individual interviews with the delegates and affected families in the Svaneti region.

For reasons of sensitivity of information, some names will not be disclosed. Interviews will be referenced with the general profile of the interviewee, country of origin/main activity, and year of the interview.

6.3 Transitions and transformations. A conceptual clarification

There is still a theoretical and practical confusion between the definitions of transitions and transformations. In sustainability studies, the terms have been often used as synonyms, and often with a specific focus on the socio-technological component, policies, and innovations for societal transitions to a more ecologically oriented economy (van den Bergh et al., 2011).
Academic literature has only recently tended to conceptually differentiate between a transition approach, which advocates for a governed and managed peaceful shift (which might also happen within the contours of previous institutional and ontological settings), and transformations, which in turn evoke a deeper and more systemic change, including not only general 'cultural aspects' but also beliefs, values and ethics. In the words of Roggema et al. (2012, p. 2530), transformations might have "complex, unpredictable, frequently unprecedented and radical outcomes". Thus, there is an emerging need and urgency to explore the different components of such transformation, including the political implications and potential.

In fact, as Stirling (2015) warns, the "widely mooted" concepts of 'green transformations' or 'transitions to sustainability' are both non-specific and ambiguous. In relation to energy, for example, the author remarks, "pressures for transformation towards zero carbon energy practices may instead be redirected towards driving a global transition to climate geoengineering. Visions inspired by distributed renewable resources may yield instead a low-carbon transition based around centralized nuclear energy". In a Critical Review in Geoforum on 'Just Transitions', (Heffron and McCauley, 2018) warn about the fact that 'transitioning to a low-carbon economy' is "promoted by the status quo, i.e. those in the dominant position in society" and that it will "allow for a very slow transition and also one that favors this status quo and consequently will result in a continuation of the ongoing inequality in society". If we look at hydropower and other large-scale renewables today, we see how they are expanding their extraction frontiers globally, legitimized by a global consensus *a priori* on achieving sustainability through renewable energy (a process explained in Chapter Four of this thesis), and contributing to the increase of supply of all forms of energy for the growing world economy.

Again in Stirling's words (2015, p. 54), "history teaches [...] that the only sure way to achieve any kind of progressive social transformation is through unruly democratic struggle." Recent literature in sustainability studies and political ecology has taken these words seriously, and increasingly calls for more research and engagement with social movements to better understand and make sense of their transformational potential. Temper et al. (2018) warn for example about the poor attention given so far by sustainability literature to the role that social movement activities and resistance play in transformations, particularly compared to the rich array of Environmental Justice studies, Critical Development studies and Political Ecology literature (Chatterton et al., 2013; Escobar, 2008; Scheidel et al., 2017; Sikor and

Newell, 2014). EJOs and local activist communities are rather understood here as forces for sustainability, for their strong questioning of socio-metabolic patterns of extraction and consumption that lead to unbearable living conditions for impacted communities (Scheidel et al., 2017).

Looking back at the forces confronting each other at the World Water Forum in Brazil, we can argue that governments, companies and institutions rather advocate for a managed transition, one that Scoones et al. (2015) call technology-led and marketized. On the contrary, social movements and activists at the people's forum demand 'unruly and radical transformation', namely profound changes that tackle 'the roots' of the problem (Shrivastava and Kothari, 2012), i.e. the capitalist management and commodification of food, water and energy, as well as health, education and public services, etc. Through this political and epistemic work of unpacking and understanding the ultimate problem faced, multiple dimensions are exposed; massive infrastructure endeavors in the communities' territories especially affect three fundamental sources of livelihood and life namely land, water and energy.

6.4 Hydropower industry and processes of resource grabbing

Just shortly before the official inauguration of the WWF, communities along the Tapajós river in Brazil found themselves again amidst a wave of repression and impunity. Local inhabitants and indigenous activists (also referred to as Environmental Rights Defenders, ERDs) were again threatened

with death by mafia killers at the service of businessmen[55]. Deforestation, dams, mining and road construction often are the combined ingredients of a lethal 'development' cocktail for inhabitants of affected regions; they see their waters, forests, lands and other sources of livelihoods being 'grabbed', diverted and dispossessed. In this section, a brief overview on processes of land, water and energy grabbing related to hydropower will be reviewed, and their interconnection will be discussed.

6.4.1 Hydropower and land grabbing

Processes of land grabbing have been largely addressed and analysed in both academic and activist literature (Borras and Franco, 2013; Cotula et al., 2009; De Schutter, 2011). The term, first coined by the organization GRAIN in 2008 and adopted by many others now including academics, refers to large-scale acquisitions of land by mainly agribusiness corporations, particularly in the countries of the Global South and where the land is considered 'underperforming' in terms of productivity. The focus of land grabbing studies so far has mainly been the agribusiness sector, where power unbalances and abuses clearly benefit companies and investors.

However, similar processes of injustice are to be found also in relation to the grabbing of land for dam construction. According to McCully (2001), the world surface submerged by dam reservoirs was 400,000sqkm, more than the area of Zimbabwe. Seventeen years after the publication of his book, we need to ask this question again, especially given the rise in hydropower installation and construction. By generally calling it 'land acquisition', as per the discourse of the World Bank, governments and finance actors, the 'grabbing' dimension has been invisibilized or neglected: acquisitions have all too often

[55] Jonathan Watts writes in The Guardian on 22nd March 2018 about river defender Ageu Lobo Pereira in the Tapajós river valley being targeted by local business people. Accessible at: https://www.theguardian.com/environment/2018/mar/22/world-water-day-deadly-plight-of-brazils-river-defenders-goes-unheard

been carried out through forced displacements and violent actions, as also pointed out in Chapter Five of this thesis.

Apart from land grabbing due to submergence, other issues include the amount of forest land being diverted to other land uses serving the dam (road constructions, transmission lines, etc), and the amount of land left barren or less fertile after the construction of dams, due to diversion of waters and to the alteration of other ecological cycles (like the limus sediments deposit). In Himachal Pradesh, India, activists lamented the fact that Environmental Impact Assessments (EIAs) for projected dams do not include the area of forests diverted for transmission lines, which distorts the figures on the overall impacts of dam construction. In Chile, EIAs of transmission lines for the (now suspended) Hidroaysén project were produced in a fragmented fashion, i.e. they only looked at a short stretch of land at a time and did not evaluate the overall infrastructure, a method that generated rather low figures of forest land diversion, and thus made them more socially acceptable (Interview with member of ECOSISTEMAS, Chile, 2012; EJAtlas, 2015e). In the case of the Kamchay dam in Cambodia, built by Sinohydro in Bokor National Park, the access to large patches of the forest is denied to local inhabitants, who have lost their sources of livelihood, such as bamboo, fruits, and other forest products which generate their income (Siciliano et al., 2016; EJAtlas, 2018c). Around the contested Gibe III dam in Ethiopia (operational since 2016), a report by the Africa Resources Working Group (ARWG)[56] questions the results of the project's EIA and warns about the high risks for the ecosystems and communities that depend on the water flow and the land ecology of the Omo valley. These include an increased seismic activity and landslide potential in the region, the elimination of a consistent part of

[56] Africa Resources Working Group (ARWG), 2009. A Commentary on the Environmental, Socioeconomic and Human Rights Impacts of the Proposed Gibe III Dam in the Lower Omo River Basin of Ethiopia

riverine forest and woodland due to a 50%-60% reduction of river flow volume, and, among other impacts, a decrease in cultivation by indigenous communities (EJAtlas, 2017l).

Another aspect of land grabbing through the introduction of dams into new territories is the side projects that may be accompanying. Dams cannot be understood as stand-alone infrastructures, and are often one of the many elements of the re-ordering of the territory for extractivist or industrial activities (Ceceña, 2004); other concessions often coincide with the hydroelectric plant, such as mining concessions (see the emblematic case of the Brazilian iron mining company Vale, its participation to the Belo Monte joint venture and the newly opened concessions in Carajás), and industrial parks (eg. aluminium smelter plant and the Akosombo Dam, Ghana) which will further increase land acquisitions.

Another driver for land grabbing by dam construction is the aid-trade-investment triangulation, by which international agreements for investment in the hydropower sector come together with other aid agreements and trade deals. One example is the Bui Dam in the Brong Ahafo region of Ghana, the main single investment by China in the country (EJAtlas, 2018b). The dam is funded by the Chinese ExIm-Bank via a commercial loan and buyer's credit, as well as by the Government of China via a concessional loan. Loans are paid back on the basis of a trade agreement between China and Ghana, according to which Ghana will pay with revenues derived from cocoa production (Hensengerth, 2013; Odoom, 2017). Because this could lead to an increase in hectares of cocoa plantations in the country, concerns have been raised related to food sovereignty, ownership of land and water consumption. The same Ethiopia's Gibe III dam mentioned above is a key component of a massive industrial project in the lower Omo Valley that includes a cascade of water-intensive mega dams, as well as sugar and cotton

plantations for export. In Brazil, the 8,040MW Sao Luiz de Tapajós HPP is another case in point. This dam, which IBAMA (Brazil's environmental agency) has now suspended over concerns of social impacts on indigenous peoples, will not only provide electricity, but also reduce the cost related to food exports from Brazil to China by linking remote industrial farms in Mato Grosso state with the Amazon River and the seaport of Belem by a new waterway, the Tapajós-Teles Pires (Blocksom and Locatelli, 2016; EJAtlas, 2016l).

Through these examples, we understand how land grabs do not only happen through property or leasing titles, but also through the drastic alteration of the ecological functions, security, and accessibility to the land and forests. Processes of land grabbing by the construction of dams and other infrastructural projects need therefore to be analyzed in this overall complexity and multi-dimensionality.

6.4.2 Hydropower and water grabbing

Academic and activist literature has increasingly reported upon the processes, features and cases of water grabbing. These works, mainly belonging to agrarian studies, have especially focused on the interplay between water and land grabbing, biofuels, and large plantations (Dell'Angelo et al., 2018; Franco et al., 2014; Rulli et al., 2013). Dell'Angelo et al (2018) even hypothesise that water might actually be the main driver of the global land rush (rather than land itself), and warn that this is "an understudied mechanism of water appropriation" associated with large-scale land investments in agriculture in our globalized world. The authors also distinguish between 'green water' collected from rainfall and incorporated into the land, and 'blue water' indicating large quantities of water derived

from channels, pipelines, etc mainly for irrigation. Another line of research on forms of water grabbing is the calculation of the water footprint, at the global level (Hoekstra and Mekonnen, 2012), in soybean production (Pengue, 2005), and in relation to the metabolism of socio□ecological systems (Madrid-López and Giampietro, 2015).

A special issue introduced by Metha et al. (2012) widens the perspective on water grabbing, stressing both the continuity with land grabbing and the newer frontiers of this phenomenon. Increasingly, attention is given to the benefits of use of water reallocated to powerful players not only through land deals, but also through mining, energy and hydropower projects (Matthews, 2012; Mehta et al., 2012; Sosa and Zwarteveen, 2012). A common denominator amongst these different applications is the dimension of injustice and power imbalance in water usage, thus the notion of 'grabbing'.

An important concern in this literature is also water privatization and its legal frames, as well as an increased involvement of private actors in the construction of infrastructures and the diversion of waters to benefit private interests, both foreign and domestic. Privatization targets both the infrastructure and the service, as well as the resource itself (Bakker, 2007; Wagle et al., 2012; Block and Nelson, 2015) This turn might represent the extreme frontier of water privatization today[57].

In relation to dams, literature on water grabbing points to the physical capturing of waters through infrastructures, as well as to the legal frames forged by powerful actors to secure the long term exploitation of water resources (Islar, 2012). Dams are a key component of the national water

[57] Examples include the Shivnath (or Sheonath) River in Chhatisgarh (India), the longest tributary of the Mahanadi River, sold in 1998 to a private industrial company; the Canal Villanueva, part of the river Luján in Argentina, providing water to construction works; the rivers Selangor, Langat y Klang in Malaysia, whose rights were given to depuration companies. Another case of private rights over river waters for industrialist use is the Liri Valley in Southern Italy already in the XIX century (Barca, 2007)

management apparatus, which shape the hydrosocial territory and the river basin waterscapes (Crow-Miller et al., 2017; Rodríguez-Labajos and Martínez-Alier, 2015; Swyngedouw, 2015; Wittfogel, 1981). They are increasingly becoming means of capital accumulation by private companies, banks, investment funds, etc., and a means of excluding local communities and delegitimizing their practises in relation to water.

Even if private dam infrastructures or long-term concessions to private companies (or state companies operating under the same logic) do not formally privatize the water body, they *de facto* hold an exclusive private right to it by excluding other uses of the water. This happens for example in the case of the Tehri dam in Uttarakhand (India), where water extraction for irrigation from the reservoir is prohibited to local villagers, as well as fishing or transport services on its waters (Interview to elder female villager in Tehri dam affected area, India, 2010; EJAtlas, 2017m).

The Tehri dam

At 260.5m high, the Tehri Dam is the largest in India. About 5500ha of agricultural, forest and other land were taken over by the project. Activist Vimal Bhai, in *Water Conflicts in India: A Million Revolts in the Making*, estimated the affected number of people was likely higher than official estimates, suggesting about 100,000 people were directly affected, while about 80,000 people on the other side of the Bhagirathi-Bhilangna lost access to basic amenities as well as important towns. According to Bhai, the project faced opposition and controversy from its inception in the 1970s. Main reasons of the protest are the negative socio-economic impact on villagers and their subsequent displacement, as well as its environmental hazards and latent seismic threats. Rehabilitation measures for the displaced have been poor, and not yet completed. Some have remained in nearby areas, while other families had to move to resettlement camps close to bigger towns, at four-hour drive distance. Villagers reported to be pressured for accepting monetary compensation by the state company, as there is no comprehensive plan for land for land rehabilitation. New Tehri city is ill-suited to residents from health and livelihood points of view, as

Figure 6.1 Boat service by the Tehri Hydro Development Corporation, the only allowed boat in the Tehri reservoir, where other uses of the waters are prohibited. The reservoir, created since 2005, displaced around 100,000 people, according to a local EJO, Matu Jan Sanghatan, while official figures remain highly contested. Photo credit: Daniela Del Bene, 2010

At a time of an increasing expansion of the hydropower industry, especially along smaller rivers and narrow valleys, it is of high priority to understand the drivers and the features of an 'extractivist' hydropower industry and how it replicates forms of water grabbing at ever larger scales. In Chapter Four I argue how in the case of Himachal Pradesh, such justification is built around

the discourse of sustainability and renewable energy, along with a 'consensus of infrastructure', which pushes the commodity extraction frontier of hydropower towards new valleys and rivers (especially through the Run-of-River schemes). Islar (2012) traces an interesting parallel between the discourse of 'marginal land' and the consequent justification of biofuels expansion in this 'underutilized' land, and the expansion of hydropower in previously untouched river valleys in Turkey to avoid what state representatives describe as the 'wastage' of water flow to the sea.

Both the discourses of sustainability and efficiency evidence the narrow understanding of policies and governments concerning the ecological water cycle, specifically the lack of recognition of the fact that 'underutilized' water nurtures the vital cycle of the ecosystem itself, and recharges ground water on which large sections of the population directly depend. This often becomes an explicit endorsement of dispossessing activities, along with the delegitimation and disregard of local populations and community-level resource management practices. Scientific research has well documented how water quality is diminished in storage dams and reservoirs because it becomes polluted and not suitable for human use and consumption (Lerer and Scudder, 1999; McCully, 2001; Petts, 1984); how evaporation increases and the land dries (McJanneth et al., 2008) and how precipitation patterns change (Degu et al., 2011; Hossain, 2010).

Other forms of water grabbing due to dams remain less visible, but nevertheless have severe impact on the health and wellbeing of local inhabitants. In the case of Run-of-River schemes, for example, water recharge systems are disrupted as a result of the tunneling activity. Furthermore, as described in Chapter Four of this thesis, water springs have dried up at an accelarated pace during the construction of one of tunnels for the Sawra-Kuddu dam. Similar impacts on groundwater sources are

registered in many other cases, such as the Tehri dam, where villages lying on hills above the tunnels are now left without water. In Mexico, projects like El Naranjal on the Río Blanco, the largest dam in the state of Vera Cruz, have resulted in the drying up of artesian wells upon which local population rely for their daily needs (Ejatlas, 2016g). In Colombia, the Hidroamoyá project in Tolima, which got CDM funding, left forty-five streams dry after the construction of the tunnel (Rios Vivos, 2016).

Traditional water management systems are also affected by water grabbing. Himachal Pradesh is again an example of how water grabbing happens at multiple scales, and reaches multiple dimensions of village life and economy. The region, especially Kangra district, is famous for its widespread network of water channels, known as *kuhls*, a traditional irrigation system in a terraced landscape. Communities have also used the kinetic force of water to run *gharaats*, small community mills to grind wheat. Due to dam construction, kuhls are affected, as less water runs through them, bringing important changes in village economies and practises (Baker, 2014; 2005):

"In Kandbari village area only one kuhl is now has water after the construction of a small hydropower project close to our village. We have always had our kohlis[58] *taking care of the channels and gharaats, now the government wants to take over that community task through the Irrigation and Public Health department and get control over them. But we don't want to decrease people's initiative in water management and want to preserve this system. There is usually less money involved, or we can even exchange in kind, for example grinding wheat in exchange for some grains for the kohli."*

(Interview with local activist in Kangra district, India, April 2015)

[58] *Kohlis* are the people responsible for the maintenance of the kuhls, a rotating task among the men of the village

These cases exemplify the wide array of manifestations of visible, and less visible, water grabbing processes emerging from both large and smaller dams.

Figure 6.2 On the right, traditional *kuhl* in Kandbari village. On the left side, an old *gharaat*, wheat mill. Photos source: Indian Water Portal.

Figure 6.3 Terraced fields and a *khud* (smaller stream), Kandbari village, Himachal Pradesh. Photo credit: Daniela Del Bene, 2015.

6.4.3 Hydropower and energy grabbing

Although the literature acknowledges processes of water grabbing in the generation of energy, for example for cooling down nuclear plants or coal-fired power plants (Macknick et al., 2012), making the link between hydropower and energy grabbing has been more difficult. Activist literature defines energy grabbing as a process "exercised using a variety of practices by which a country [...] gives itself the right to acquire the energy resources of foreign countries by a variety of different means [...]" (Llistar-Bosch, 2015). The concept has been mainly applied to large deposits of hydrocarbons and uranium, extracted and exported or used by large industries. Llistar-Bosch also makes reference to the construction of mega-hydroelectric dams, but here again the 'grabbing' dimension mainly refers to the land submergedand water diverted by the dam.

Yet the grabbing of energy has an additional dimension, which can be defined as the imposition of a given understanding of 'Energy', which is only to be generated through large-scale and centrally controlled energy systems. This is at the expenses of the contextually diverse uses of energy sources, which would instead be wiped out or drastically altered. Following the provocation by Hildyard et al. (2012), the former can be referred to as *Energy* with a capital "E", as the abstract massive and uniform commercial generation of energy and as a function of capital accumulation. Meanwhile the latter includes the multiple and ecologically grounded uses of *energies*, with a small "e", as a function of the reproduction of life, like food for humans, fodder for animals, fuelwood or timber, the kinetic force of water through mills, warmth produced by the sun and the photosyntesis process (*ibid.*). Energy grabbing can therefore not only happen between countries, but also within the same country and between social groups and economic actors where power imbalances shape their relations.

Again the example of the kuhls-conveyed kinetic force of water for the gharaats in Himachal is an illustrative example, but other sources of grabbed 'energies' also include the food, fodder and wood from the inundated forests which for rural households often constitute the main sources of endosomatic and exosomatic energy. Instead, families displaced by dams are promised free or subsidized electricity (although not always fulfilled), as well as electric kitchens, etc. A whole ecological system shifts away from an integrated resource management, control and reproduction, to electricity-dependent and centrally controlled power generation and distribution, and commercial sources of food. Concerns arise over the increased vulnerability of these households and economies, not only for the ecological changes, but also for the loss of food sovereignty, and an increased concentration of power and wealth in the hands of energy/electric companies accompanied by the reduced availability of and care for the commons.

Energy grabbing can also be understood and analysed from a broader perspective. Large hydropower infrastructure usually requires large amounts of initial investments and not all countries have the financial means to start new projects. International funds can therefore be invited as Foreign Direct Investments, or international aid, to support infrastructure expansion. However, the donor country has the power to shape national policies in favour of its own interests or to lock the recipient economy in to specific agreements for decades. This resonates, for example, with what Odoom (2015) demonstrates about Chinese dam developers interested in accessing oil reserves in Africa, and with China's interests in assisting Ecuador in dam building (Sinohydro completed the EPC 1500 MW Coca Codo Sinclair HPP) to get access to oil, including oil pre-sales to PetroChina, by paying in advance the Ecuadorian government in exchange for guaranteed future oil shipments (Kirchher, 2018)

6.5 Transformative forces in anti-dam resistance

Chapter Four and Five explain how hydropower is being promoted as sustainable and green, and as a complementary component of the Renewable Energy mix together with solar, wind, etc. However, the way out of fossil fuel reliance towards renewables is likely to be one of the most contested areas of policy and politics over the coming decades. Already, at the sites of dam construction, ecological conflicts are on the rise and usually reach very high intensity in terms of repression and contestation.

Recent scholarship on sociotechnical systems change increasingly acknowledges that transitions to sustainability, including renewables, might require policy mixes that can destabilize existing regimes while creating space for 'innovative alternatives', described as processes of disruptive innovation or creative destruction (Kivimaa and Kern, 2016). A comprehensive agenda for energy transition would demand a combination of policy instruments that seek to both resist dominant energy systems and support their replacement. Most importantly, in those places which have thus far been neglected and do not receive sufficient services or facilities, such transition should not replicate the impositions of the top-down policies and 'solutions', but instead they could be designed together with beneficiaries and in an ecologically and culturally sound manner. However, literature points to the lack of sufficient attention given to these innovative alternatives and their viability (Burke and Stephens, 2018; Kivimaa and Kern, 2016; Turnheim and Geels, 2012), to the lack of recognition of social movements and communities as forces for sustainability in themselves (Scheidel et al., 2017), and to the transformational potential of ecological conflicts (Temper et al., 2018).

Traditionally, in political ecology and environmental justice studies, resistance by social movements and communities at the forefront is understood as oppositional, i.e. rejecting projects and pushing back their proponents. Often, these resistances are also perceived as having a NIMBY meaning. This section argues that the initiatives and politics of movements also try to go beyond *resistance* as such, and work for a *re-existence* as well (Walsh, 2013); resistance is not only a 'rejection' of something, but also the construction or reconstruction of different and differing conditions of existence and reproduction of life.

Renewables, and specifically hydropower, might actually be a catalyst for such transformative efforts, as a delicate and double-edged ground for dispute. The concept of 'renewable' in fact captures both desirable technologies to develop democratically and in an environmentally sound fashion but also, as discussed above, the mega schemes for the same powerful elites to advance capitalism through resource grabbing, and extractivism along new commodity extraction frontiers. Social movements and communities challenge this paradoxical double meaning: they denounce the false 'renewability' of mega hydro projects and the multiple grabs it implies for the affected territories and communities, and they instead promote the framing of people's energy sovereignty project which aim to create new terms to refer to transformations, and to define a 're-existence' in their territories, which Escobar (2008) would describe as the defence of other 'life projects'.

The following sections discuss three main transformative forces within anti-dam movements for the construction or reconstruction of fair conditions of existence and reproduction of life, that we have identified. These are 1) the cross-sectoral alliance among food, water and energy related movements; 2)

the alliances among multiple categories of affected people; 3) the epistemic dimension of the dispute around water and energy. Lastly, a tentative definition of energy sovereignty is presented, as a slogan increasingly used by anti-dam movements, and as a complementary concept to land sovereignty and water justice to address the processes of resource grabbing and to weave new forms of sovereignty.

6.5.1 'Scaling out' across sectors; anti-dam movements as *tejedores de soberanía*

The sectoralization of social action on specific issues is one of the major challenges movements have been increasingly addressing. The slogan "Food, Water, Energy are not Commodities" (*'Alimentos, Agua, Energía não son mercadoria'*), used by MAB in Brazil, Rios Vivos in Colombia, and elsewhere across other Latin American countries, captures this idea and calls for an interconnection of these struggles. The slogan also responds to the processes of resource grabbing by the hydropower industry described above. According to one member of the MAB,

"[...]it is important not to think about these sectors separately, but as a naturally interdependent whole. Work can't be done on the energy sector without thinking about the role agriculture plays in its consumption, for example, or the role biofuels play in land and water grabs in the name of sustainability and clean energy"
(Interview with activist of MAB, Brazil (Rio de Janeiro), 2015).

Thus, the interviewee continued, it is important to strengthen alliances, not only at the policy level but also among the people's collectives, EJOs and social movements in order to design integrated projects and to "weave together" forms of sovereignty across the three vital sectors.

In Brazil, since at least 2012, MAB has promoted agroecological initiatives called PAIS - *Produção Agroecológica Integrada e Sustentável* ('Integrated Sustainable Agroecological Production'), of which there are now 800 across Brazil. They are circular horticulture plots, cultivated by directly affected families in lands under threat of submergence as a result of hydro projects. They usually include a water tank to collect rainwater for irrigation and sometimes electricity generation devices. In the words of MAB activists:

"Affected communities by 'bad development' are also the right place where we have to promote the PAIS, in order to question the very idea of 'development'. We understand agroecology as a new relation with nature. It's a way of life."
(Interview with activist of MAB, Brazil (Rio Grande do Sul), 2016).

"They are projects of production at the household level, but also for selling on the market and generating an extra income for the family. When you are there at the market, you share information on what can get lost with the dam, and this way you actually do campaigning. The gardens are partly funded by one of the same banks (the national BNDES) that finances hydropower plants, so we try to push the contradiction to its extremes. So much of public money is going to destructive projects. What if it was all diverted to a different vision for the country? We have today 800 PAIS project across the country, some still under construction. One of them is in Guapiaçu, one of the most productive areas, and is participated in by around 80 families!"
(Interview with activist of MAB, Brazil (Rio de Janeiro), 2016).

Figure 6.4 Field visit to one of the PAIS project in Rio Grande do Sul, October 2016. Photo Credit: Daniela Del Bene

Similar efforts are ongoing in other countries, such as Colombia, where anti-dam movements like Rios Vivos are promoting agroecology as projects to 'stay in the territory' *('proyecto de permanencia en el territorio')*, to not abandon them under the threat of submergence, to have enough resources and food for the subsitance of the families.

"Our objective is that existing dams be dismantled, but also that people have the projects to remain in the territory, that they can produce their own food. Agroecology is for us a life system."
(Interview with lead activist of Asprocig and Rios Vivos and farmer, Colombia, 2016)

"Rios Vivos started in 2011 and had its first national meeting in 2012. Very soon we understood the importance of agroecology as a project that allows you to stay in the territory and not have to abandon it. We focus now on the agroecology spirals, which means that when one starts with gardens and cultivation of local products one becomes a pioneer for the rest, who actually

follow. Now we have spirals in rivers Sinu, Cauca, Sogamoso and we hope to 'seguir tejiendo[59]*' communities and sovereignities"*
(Interview with leader activist of Rios Vivos, Colombia, 2016)

Agroecology appears to be an accessible and democratic frame for organizations, movements and local communities from where to start thinking and building different sovereignties, and long term plans to stay in the territory, and to counter the threat of displacement. Such projects seem to be particularly crucial for transformative processes. As Zibechi (2015) warned, many of the resettled families who struggled with the *Movimento Sem Terra* (MST) in Brazil, to make an example, became actors of agribusiness through contract farming mainly because of the structural lack of other alternatives generating employment and subsistence. In this latter case too, the transformational dimension in the long term is also currently rooting itself in agroecological practises, moving MST strategy from occupation and agrarian reform to consolidating agroecology in the *asentamientos* and diversification in farming. *"Beber del propio pozo"*, to use a slogan of the Theology of Liberation (Zibechi, 2015).

59 'To continue weaving together communities and sovereignties'

6.5.2 Learning to be affected; anti-dam movements broadening the understanding of 'impacts'

"Tem curso pra aprender a ser atingido?
Não, mas o tempo vai ensinando.
Nesse processo de reflexão percebo,
compreendo e aceito que não há um modelo.
Nem é externo a mim.
Vou aprender, sendo o que sou:
Atingida pela lama da Barragem de Fundão.
É necessário assumir o lugar de protagonista, de sujeito de direitos.
Mas não sozinha e sim com minha gente,
Gente que sente e passa pelo mesmo conflito.
Vou aprender, pois estou no caminho!"
(Collective poem by several 'affected' people
by the Fundão *dam, Mariana*[60]*)*

Academic literature has largely drawn attention to how rehabilitation measures for affected people by large dams have generally been poorly implemented, and that they actually increased impoverishment of the displaced communities (Cernea, 1997; McCully, 2001; Yankson et al., 2018). This is acknowledged even amongst those who believe the issue can find solutions through better policy implementation and responsibility guidelines (Vanclay, 2017). One common element of this literature is the general

[60] The poem is included in the book 'Atingidos', published by the Ministério Público de Minas Gerais and other institutions after the tailing dam failure in 2015 in the iron ore mine in Mariana (Minas Gerais) belonging to the Vale and BHP Billiton companies. What is known as the biggest environmental disaster in Brazil so far, has polluted the Rio Doce for over 300 km downstream. The burst dam unleashed 40 million cubic meters of mud on the valley killing not less than 30 people and wiped out the village of Bento Rodrigues. More than 800 people lost their homes. The toxicity of the discharges was still under discussion months after the event. The Fundao dam has no hydroelectric components, so it's not included in the list of dams in the appendix of this thesis. The poem is still relevant here because it reflects the emotional tragedy that all impacted people experience. The disaster has brought large social and political attention to the issue of displacement and impacts overall in Brazil.
See the case int he EJAtlas: http://ejatlas.org/conflict/samarco-tailings-dam-disaster-minas-gerais-brazil

framing and definition of 'affected people', which usually refers to those affected by displacement.

The World Commission on Dams (2000) defines displacement as: "[...] both 'physical displacement' and 'livelihood' displacement (or deprivation). In the narrow sense displacement results in the physical displacement of people living in the reservoir or other project area. [...] However, the inundation of land and alteration of riverine ecosystems – whether upstream or downstream – also affects the resources available for land- and riverine based productive activities." Rehabilitation policies are then designed to compensate, or 'rehabilitate' those people who lost their homes or the basis of livelihood ('directly affected people'). Obtaining a fair compensation and national policies for compensation and resettlement, has been the core objective of most (if not all) anti-dam movements in those cases where dams could not be stopped at their onset.

Yet, after many decades of struggles, today anti-dam movements are increasingly trying to go beyond the claim for compensation and to reframe the overall conceptualization of 'impact'. In order to move the struggle from a purely reactive resistance to the creation of alternative visions and politics, a much broader range of people needs to be involved and engaged. Thus, the understanding of impacts also needed to be expanded, and the broad range of valuation languages at different scales included in the analysis.

a) "We are all affected by the energy model"; overcoming the urban-rural dichotomy

One key step in this direction is to overcome of the dichotomy of urban – rural in terms of impacts. It is not only the rural communities who are affected by hydropower dams but also, and paradoxically, those who are supposed to

be beneficiaries of the electricity produced by sacrificing rural or forest areas, the urban consumers. This is the case for those urban dwellers with limited economic resources who have to pay extremely high bills to electric companies, and who sometimes can simply not afford it and thus become energy poor (Buzar, 2007; Ürge-Vorsatz and Tirado Herrero, 2012).

"In Brazil, electricity tariffs in cities like São Paulo, are very high and poorer people can barely afford them. Corporations and politicians say the important thing is access to electricity. But what's the point of having access to it when you can't afford it? Who has to have access to it then, only the rich and industrialists?"
(Interview with MAB activist, Brazil (São Paulo), 2016)

"During the 2014 drought in São Paulo, those who never had shortages of water or cuts in the suppy were industries, the paper mills, cellulose plantations, and the rich neighborhoods. Where did they 'save' it? In the peripheral neighborhoods."
(Interview with SINTAEMA[61] trade unionist (São Paulo), 2016)

"Our country has large water reserves, however, it suffers water scarcity. Why is that? Dam operators exploit reservoirs to maximize their profits, especially when electricity demand is high. They empty the lakes, so when the people need water, they respond "we have a drought and should save water". This is how they create water shortages and drought in São Paulo. An ideal opportunity to increase both water and electricity tariff, and with high tariffs they attract foreign investors and funds."
(Interview with MAB activist, Brazil (São Paulo), 2015)

[61] SINTAEMA is the trade union of Sao Paulo state for Environment, Water and Sanitation workers (*Sindicato dos Trabalhadores em Água, Esgoto e Meio Ambiente do Estado de São Paulo*)

The oligopoly of the electric market, the corporate social irresponsibility of the big electric companies, the insufficient social policies to protect vulnerable families contribute to the creation of new vulnerabilities in the urban regions which are related directly to the same power structure that pushes forwards large energy infrastructure projects in the river valleys. MAB in Brazil has in the last years launched pioneer urban PAIS projects for saving electricity in modest households in São Paolo through solar powered water heaters on house roofs[62]. According to one of the beneficiaries:

"Here we pay a very high electricity bill, especially in the peripheral neighborhoods of São Paulo. If you then add other expenses for social services, little remains for a normal family. They get indebted. They also have an assistentalist mentality, sometimes they steal electricity. Moreover, the local mafia makes it even more complex to get out of this situation. However, the issues of housing, health and energy are getting more and more politicized here. I'm trying to convince other families around here to get into a PAIS project as well. I can still save some money thanks to it."
(Interview with Neide, resident of São Paulo, social leader in her neighborhood, and beneficiary of one of PAIS projects for water heating)

[62] Additional pioneering projects with solar powered heaters have also included rural areas since 2010 aproximately, especially in the regions affected by dams, such as in the Aratiba municipality (Itá dam) for the community hospital (Hospital Comunitário).

Figure 6.5 PAIS urban installation in a peripheral neighborhood of Sao Paulo in Neide's home. Photo credit: Daniela Del Bene

By including urban dwellers from marginalized neighborhoods, MAB attempts to entwine struggles around energy in both rural and urban areas, and deconstruct the idea that the energy model only affects those communities that are directly impacted or displaced. Also, the movement seeks to broaden its support network, as agents and multipliers of transformative forces.

b) Workers united for a People's Energy Project

The second important element of the creation of alternative visions and politics by social movements is their alliance with workers and trade unions. According to the movement, they have in fact also been exploited by the capitalist energy model through the low salaries, precarious working conditions, poor social security measures and policies, as well as poor participation to decision-making.

In Brazil, the MAB in collaboration with trade unions launched the *Plataforma Operária e Camponesa para Energia* (Workers' and Farmers' Platform for Energy), to discuss the historical debt that megaprojects and energy corporations owe to those affected, the privatization of the sector, the increasing outsourcing of the electric companies (which 'fragments the trade

unions and breaks apart the solidarity among workers', according to one of the SINERGIA trade unionists interviewed), the health and safety of working conditions. They also drew up a proposal for an energy and mining policy for the country (*Proyecto Energetico Popular*), according to which the whole energy production chain should stay under people's control through solid democratic institutions, energy should not be treated as a commodity, outsourcing should be canceled and privatization banned, more support should be given to state distribution companies, and a 'service price' instead of a 'commodity price' should be defined for electricity. Trade Unions of the electricity sector are involved, such as SINERGIA-CUT and FTIUESP-CUT in Sao Paulo, STIU-DF in the Districto Federal (Brasilia), INTERSUL in the Southern states, but also the trade unionists and workers of the oil sector[63].

In Colombia, since at least 2011, anti-dam movements consolidated their commitment for a joint debate on the national mining-energy model. The nation-wide debate began in March 2011 at the First National Day in Defense of the Territories ("*Primera Jornada Nacional en Defensa de los Territorios*"). One month later, the larger Rios Vivos movement was launched, and joined hands with movements around the El Quimbo, Hidrosagamoso, Hidroituango projects, among others. Strong cooperation was established from the onset between farmers, indigenous communities, afro-descendant communities, artisanal miners (*barequeros*), fisherfolk, and other workers, especially given their close cultural and ecological relations with the water bodies for their livelihoods. Rios Vivos has proposed to government bodies the creation of a high-level panel on the mining-energy model in the country, where local communities can meet the Ministers of Environment, of Mining and Energy, of Agriculture and of other related authorities. A first forum *("Primer Forum sobre la Politica Minero*

[63] Oil, and especially the recently discovered Pre-Sal deposits offshore, is also seen as strategic for a people's energy agenda in the country. Thus, the reclaim for PETROBRAS to remain national and public, and a close engagement with the company's workers.

Energética") was held in 2013, while a mobile national panel ("*Panel Nacional Itinerante sobre Politica Minero-Energética y sus Conflictos*") traveled across several departments to discuss the national policies (such as the Plan Nacional de Desarrollo 2010-2014) and related conflicts. In this way, Rios Vivos created the opportunity and space to discuss different types of impacts and the interconnected points of the mining-energy chain with a broad range of actors. Dams were said to be only the tip of the iceberg of an imposed energy model, so the debate cannot remain only in the technical realm or limit itself to compensation measures.

c) Women and youth; recognizing specificities of impacts

A third fundamental element of the creation of alternative visions and politics is the exposure of the gender issue and the involvement of youth and children in the struggle; they are key agents of transformative resistance and of the construction of people's sovereignty. This strategic move is first due to the fact that energy is also a gender issue, because women usually suffer the worst impacts of mega projects, and are affected differently to men by displacement (Clancy and Roehr, 2003; Gaard, 2001; Gunvald Nilsen, 2010; Mehta, 2009). Secondly, the inclusion of youth and children is due to the fact they often spend many years within conflictive territories or belong to families of activists and community leaders, and hence are raised in contentious environments, which have a lasting impact on them throughout their lives. It suffices to consider the young generations and adults today in their 20s, 30s, and 40s born in the Narmada Valley in India, or in the South of Brazil, where the struggle started respectively in the mid '80s and in the '70s[64]. Additionally, women and youth are arguably the least targeted by subjugation and corruption along the struggle, according to our intervieews.

[64] We acknowledge forms of dispossession and territorial/environmental contention is of course previous to dams in unfortunately many countries in this world and have profound roots in colonialism, capitalist driven economy in general, wars, etc. Here, we wish to highlight the narrated dynamics in strict connection to dam constructions.

In India, women have been at the forefront of anti-dam resistance in the Narmada Bachao Andolan in the Narmada Valley since the very beginning, and have often had representative roles such as activists Medha Patkar in the Sardar Sarovar area and nationally, Chittaroopa Palit especially in the Omkareshwas and Maheshwar dam area, Ramkuwar in the Man dam area, to name just a few stories narrated in Mehta (2009). They have put their bodies under the severe stress of long hunger strikes, *dharna*, *jal satyagraha*[65], etc multiple times to protest against illegal closure of dam gates, forced displacements, negation of compensation measures by the state and national governments. "None of us have suffered organ damage. But really and truly, our own bodies and minds surprised us as they pushed beyond what we had imagined would be their normal limits. As all of us sitting on fast are extremely ordinary people, who normally become tense and angry if we have to miss a single meal, it was very clear that it is the deepest aspiration of the people of Maan and the Narmada valley - for land and for life, the anger and the determination of their struggle, as well as the tremendous concern and solidarity that we received from all of you expressing, the prayers and the good wishes - that was the force unleashed that kept us afloat", two of them reported after a one-month and a half long protest in the Man dam area in 2002 (NBA, 2002). Narmada Bachao Andolan activists and families in the valley organize women's assemblies in the affected areas, where women can feel safe and free to share experiences they would maybe otherwise not disclose, and to support each other. For example, Ramkuwar's story, written by herself and included in Metha (2009), is particularly representative of the repression and harassment women suffer but also how the struggle has been for her a 'transformative experience' that of made her aware of her rights and

[65] Dharna and Jal Satyagraha are hindi words for peaceful protests that consist respectively of sit-ins (which could last for several days and in extreme weather and temperature conditions) and protests in the rising waters of the reservoir. The latter is perhaps the most extreme measure the affected families have to put pressure on the government. It usually comes with the threat of letting themselves drown in the waters if the dam gates are not reopened and proper rehabilitation and resettlement measures are not taken.

of how her struggle for social justice within a process of 'dispossession by development' does actually go beyond her own personal experience of displacement.

In Brazil, according to a MAB female activist based in Rio de Janeiro, women did not usually participate in large numbers in the movement in its beginning (in the '70s and '80s); their participation progressively increased later. It was in 2012 when the national coordination of MAB organized a meeting dedicated to women's involvement in Brasilia, and the issue became much more visible.

"In the first pictures of the MAB activists from the '80s, you could actually hardly see a woman. They became more engaged progressively. In our meeting in Brasilia, more than 800 women took part in the gathering. Since then, our movement is also working internally on the matter, questioning and being self-critical of internal dynamics, structures, and patterns. We encourage participation of women in the direction of our movement. Dilma R. was entering into power at that time, this gave hope to other women. We had a meeting with her, and we handed over to her a copy of the MAB principles. Within the struggle, we realized there are differences between men and women both in visions and in the way we pursue our struggles"
(Interview with MAB woman activist, Brazil (Rio), 2016)

Here as well, the urgency of the issue is due to the particular grievances that affect women in dam-affected areas. Among others, specific impacts relate to the invisibilization of their domestic work and activities related to life reproduction, the loss of the basis of these activities which are usually not monetarily valued and hence not compensated, and the loss of social and community bonds. Besides this invisibilization, violence is the extreme form

of exclusion and exploitation. In 2010, the MAB, together with the *Ministerio Publico* and academics, worked on a special report, which looked at seven large projects and exposed seventeen significant violations of human rights. The study concludes that the current pattern of dam building in the country causes "grave violations of human rights, whose consequences lead to an increment of the already high social inequality, which ends up in misery and social, familial and individual destruction" (own translation, CDDPH, 2010). The pattern of violation of human rights is acknowledged to be worse against women, especially related to forced sexual labour, sexual violations and unwanted pregnancies, exclusion of women at the time of negotiation for compensations, etc. The internationally known Belo Monte project, for example, has even had a *boate* (brothel) within the construction site, and this forced the *Comissão Parlamentar de Inquérito do Tráfico de Pessoas* to launch an investigation[66]. Violations repeatedly happened at the Tucuruí Dam during the '80s and Santo Antonio Dam in 2009, and will possibly continue happening in other place across the over 60 large and smaller dams planned in the Amazon.

Since 2014, the movement revived artistic work to process traumas and sorrow, the *arpilleras*, a embroidery artpiece originally used as a tool of protest and denunciation by Chilean women during the Pinochet dictatorship (Moya-Raggio, 1984; MAB, 2015). The slogan "Food, Water and Energy are not commodities" became more nuanced as it was expanded to "Women, (food), Water and Energy are not commodities" (*Mulheres, Aigua, Energia nao son mercadoria*).

[66] More details here: http://racismoambiental.net.br/2013/03/06/cpi-aprova-convocacao-do-presidente-do-consorcio-da-usina-de-belo-monte/#.UTevqMx-Vdo.twitter. Last accessed 27.02.17

"With the arpilleras, we reclaim a collective right to mourning. Impacts are not only individual facts, they are collective traumas. The essence of MAB is to pursue our struggle collectively, so the elaboration of traumas has to be collective. Arpilleras are handcrafted at women's gatherings, they are a tool for political training as well. Until now, we have had around 150 such gatherings, with more than 900 taking part from across the country."
(Interview with MAB female activist, Brazil (Rio), 2016)

Youth and children are also increasingly involved in anti-dam movements. As explained above, entire generations continue to be raised and have grown up in the struggle. Children often drop out of school, due to displacement and lack of school facilities in rehabilitation areas (Thukral, 2009; Thukral et al., 2008). In other cases, families might stay in threatened areas for years despite no longer receiving public services including school. Displacement, environmental and territorial impacts and the disruption of social bonds represent emotional traumas for children which are often exacerbated by seeing their parents often busy in contentious political community activity. Therefore, movements have started to establish educational spaces, and to build upon the social structure of support and care of the community that public authorities lo longer provide.

In the Narmada Valley in India, the *Jeevan Shala* schools (Schools of Life) have been running since early '90s. In 1991-92, when tribal villages in the Narmada valley were determined to challenge unjust submergence due to the rising wall of the Sardar Sarovar Dam, Jeevan Shalas were started in Chimalkhedi and Nimgavan village. Their slogan moved from the widespread NBA's *"Ladenge Jeetenge* (We will fight, We will win) to "*Seekhenge Baddhenge!"* (We will learn, We will grow!). Given that the struggle has been central to the inception of Jeevan Shalas, these schools are essentially a place to nurture values generated by people's struggles, and they

are taught and shared in the local languages. Jeevan Shala children have always participated in the struggle against dams in their villages and elsewhere. According to the NBA support website "There have been times when the Jeevan Shala shifted to the place of the protest, as learning to fight for one's rights is at the very heart of learning in Jeevan Shalas. During the 1992 monsoon, children from Chimalkhedi Jeevan Shala refused to move out of their school when the Narmada waters began to rise. Children from Jalsindhi and Nimgavan Jeevan Shalas have taken out protest rallies to the police camps during the 1999- 2000 Satyagraha, questioning the officials and the policemen with confidence and courage."[67]

In Brazil, MAB also has specific programs and training for youth, including music and art. Since the '90s the organization, together with Movimento dos Trabalhadores Rurais Sem Terra (MST), holds the *cirandas*, educational and playing spaces with a political objective. Children learn by playing about why their territories are changing, why they need to move from their homes, but also why resistance is important and why their parents suffer, cry, get angry, and have fear. Additionally:

"Educational activities and games are focused on sharing values like solidarity, friendship, sharing, empathy. We also learn together that energy is not a commodity but a commons, and that we have to take care of waters, forests, rivers. Children learn in other terms what adults discuss all the time. They learn they can also have similar conversations. Problems are similar for all, but are experienced and communicated of course differently."
(Interview with a MAB activist and ciranda pedagogist, Brazil (Sao Paulo), 2016).

[67] narmada.org. In Maharashtra Jeevanshala started in 1992, in Madhya Pradesh the first school opened in 2004. Children's families pay the fees according to their capacity, usually in grains.

According to an organizer of one of the cirandas, “having a space to share with children, where they can experience and feel with the same intensity as myself, this is just fantastic”[68]. After one of the cirandas in 2013, children wrote a letter with their basic demands. These included access to healthy nutrition without agrotoxins, the provision of land for farms and for homes, and the ability to play in clean and free rivers.

[68] A video of a 2017 Ciranda by MAB can be found here: http://www.mabnacional.org.br/video/esta-ciranda-do-mab

Figure 6.6 (above) One of the arpilleras collected in the book. It particularly exposes the impacts that transmission lines have and the cutting up of lands and fields for their installation. Photo credit: Daniela Del Bene
Figure 6.7 (in the middle) Symbolic elements from one of the ciranda by MAB related to feminism, antimiltarism, child protection, protection of workers, and the slogan "Water and energy are not for sale!" Photo credit: Daniela Del Bene
Figure 6.8 (below) The 2017 ciranda in Sao Paulo, where around 4,000 MAB activists from across the country gathered. Photo credit: MAB

6.5.3 An epistemic struggle; anti dam movements and pluralist worlds

Free rivers (Rios Vivos) is the only possibility we have
for peoples being free, alive and able to stay in their territories.
(Interview with leader activist of Rios Vivos, Colombia, 2016)

"La tierra es la que te parió, por que ahí está tu ombligo.
Es como una madre, y a nadie le gusta que le cambien de madre"
(Interview with young woman activist
from Zapotillo dam area, Mexico, 2010)

As we have seen in the statements reported in the Introduction of this chapter, ecological conflicts and resistances to dams have contributed to the articulation of different values and visions, especially around land, water and energy. In this section we argue that anti-dam movements and EJOs have importantly contributed to a pluralist understanding of them, beyond the concepts of 'resources', 'displacement', and 'compensation'.

Slogans like "Food, Water, and Energy are not Commodities" are clearly anti-capitalist and oppose the market-oriented approach to the management of the territory. Following Karl Polanyi, this can be understood as the opposition to "the tragedies of enclosures" and the "generalized market system" where monetary value becomes the only measure of benefit and costs. The resistance to the destruction of rivers, mountains and forests and other landscapes has contributed to the framing of a broader understanding of *territory*, and most importantly of the *relations of people with it*. This is probably most apparent in people's attachment to the land, and their firm

rejection of abandoning their own land regardless of what monetary compensation is set on the negotiation table. This is the case for example of the thousands of farmers, fisherfolks, forest dwellers, and adivasis (indigenous groups) in the Narmada Valley, in the Polavaram dam area in Andhra Pradesh, India, and also in the Temacapulin resistance in Jalisco against the El Zapotillo dam and in Guerrero state against La Parota dam in Mexico. These cases have had different outcomes, as in India the dams have been built or are under construction, whereas El Zapotillo and La Parota are currently suspended allegedly due to social unrest and opposition. However, in most of the cases where people's movements agreed on a united rejection to compensation, projects have been significantly delayed and the issue has become a political debate, with companies or donors even withdrawing such as the World Bank did from the Sardar Sarovar Dam in India. Land is usually associated with housing, agriculture or other productive activities, yet the spiritual dimension and the relation with 'other worlds' should not be neglected. Many burial sites for example, which are key places of reunion with ancestors and spiritual heritage, are located close to the rivers, and are thus under threat of submergence, such as in Hasenkeyf for example (in Kurdistan, EJAtlas, 2017n), or indeed they are already inundated, such as in El Quimbo (Colombia, EJAtlas, 2017a), Tehri (India, EJAtlas, 2017m), Dardanelos (Brazil, EJAtlas, 2017o), etc. The loss of such places disrupts the inhabitants' whole sense of connection to the place and to their cultural heritage.

The claims that 'water is life' and that communities have strong material and cultural attachments to water bodies are other examples of grassroots valuation languages. Humans and rivers share intertwined existences, which are enshrined in myths, legends and stories that are part of the common imaginary. One example is the Zenu communities of the low Sogamoso basin, in Colombia, about whom Fals Borda (2002) described an 'amphibian

culture' as an integral coexistence between humans and the whole river ecology, which includes the type of infrastructures, and agricultural-husbandry activities they practise.

As Escobar (2016) identifies, the attachment and the incommensurability of the value of one's own land and water with other values such as monetary compensation or the 'development' of the country strengthen the defense of the territory, of life, and of community land as one cause. This means that they are part of the same political struggle within what Escobar calls the "relational world" or "relational ontologies". Escobar refers in particular to the Colombian Afro-Caribbean context, but the same can be applied in relation to many other political ontologies (Blaser, 2014; Yates et al., 2017), among indigenous communities, quilombolas in Brazil, afro-descendent, adivasis, etc as well as among other rural and urban communities, despite they might deploy different valuation languages and cultural references.

"In Maya languages, we say that there is a world below, one here, and one above. Our concept of territory is more holistic and complex. These worlds are the spaces where we live, not only the land but also other natural elements and the relations with the other members of our communities and beyond, including our authorities, history, memories. We are brothers of the trees, rivers and forests, who are members of such worlds. If we use something from them, there is a whole ritual to ask for permission and to apologize. We all exist because others also exist. Dams in this context not only have ecological impacts, but will mean the end of our lives as we know them."

(Interview with member of Consejo Pueblo Maya – CPO, Guatemala, 2016)

"'Rios para la vida, no para la muerte'[69]*. This is the slogan rising from our affected valleys and peoples. Rivers are life-givers, we all depend on them, on their waters, fisheries, the vegetation that grows along their banks, for transport, etc. Our cultural life took shape around them. We are together with them. Now they have turned into places where we risk our lives, where massacres are being committed, places of sorrow and mourning. We say that land, water and energy are not commodities, as the capitalist economy has caused all this. The only way we can live free is by leaving our rivers free too. Rios Vivos para Pueblos Vivos"*

(Interview with villager and member of Rios Vivos, Colombia, 2016)

"Jal, Jangal, Zameen. Our peoples have to struggle for these sources of livelihood amidst processes of forced land acquisition, enclosures of forest land, diversion of water bodies, etc. It's essentially a struggle for life, because there is no life in resettlement sites. People do not know the new plants, there is less biodiversity, and agriculture in the plains is different from farming in the hills. All cultural and material references are lost. They lose their identity and their worlds, as they have experienced them for all their lives."

(Interview with senior activist of Matu Jan Sangatan, Uttarakhand, India, 2015)

The above citations stress an increasingly common feature across multiple anti-dam resistances: the epistemic dispute of knowing, valuing, and defending the territory. The Mayan activist stresses the holistic pattern of relationships that constitutes his territory and how dams and other extractivist projects undermine its overall existence. The Colombian activist points to the tight relation and interdependence between the freedom of a river and that of

[69] Trad: "Rivers for life, not for death"

the people living around it. The Indian activist revives a slogan of the adivasis in central India, claiming that water, forests and land should be considered one whole, and that their rights over forests should include all these components (Xalxo, 2007). These claims gain particular importance at the time of addressing the continous corporate and government's attempts to divide and seccion land and waters in order to carry out feasibility studies, impact assessment studies or compensation policies.

6.5.4 Energy Sovereignty. A tentative definition of a transformative framework

The sections above describe potentially transformative forces created and shaped within the resistance and movements against dams. This trend that increasingly characterizes anti-dam struggles is in fact created as a result of the intersection of resistance processes. In order for these forces to converge into a common political project, an ambitious initiative began to take shape in 2010 in Latin America, starting in Brazil and then picked up by other Latin American movements such as the construction of a People's Energy Project (*Proyecto Energetico Popular*, described in section 6.5.2.2). Such project is inspired by the principles of Energy Sovereignty, and can be understood as an attempt to design a practical political program to counter the processes of grabbing and dispossession illustrated at the beginning of this chapter.

The concept of energy sovereignty is not new[70]; it has been used since the 1990s in Latin America to challenge the privatization of basic energy services

[70] In some context, especially in English language, the concept of 'energy democracy' is preferred. For this chapter we deploy the term 'sovereignty', in accordance with the explanation given by Latin American movements, i.e. to claim the fact that *"our territories have been dispossessed for at least five hundred years, thus for carrying out any significant change we first need to reverse the dispossession of sovereignty that afflicted them. Only by doing so, there will be space for just practices to emerge"* (Abstract from a Colombian activist with Rios Vivos during at focus group on the understanding of 'energy sovereignty' held during the International Rivers gathering in Tbilisi, Georgia, 2017)

by transnational corporations and the "corporatization" of the state enterprises. Similar to the claim for food sovereignty by farmers' movements since mids 1990s and to that of water justice since the early 2000s, energy sovereignty has become popular among organizations and movements in particular after 2000 in Latin America. It has spread globally and into the academia as a response to multiple forms of extractivism, energy poverty, corporate oligopoly, patriarchy, privatization and trade agreements, wars and crimes to secure provision of fossil fuels (Del Bene et al, 2018b). Energy sovereignty refers to political projects and visions towards "just generation, distribution and control of energy sources by organized and conscious communities, provided that these do not affect others negatively, and with respect for ecological cycles" (Xarxa per la Sobirania Energética, 2014). Energy Sovereignty acts as a slogan for organizations and movements to reclaim the right to decide upon energy, understood as a natural commons and basis of life for all, such as how much to consume, how, by whom, where and for whom.

Drawing on pluralist views and understanding of territory, energy, environment, etc., the concept goes beyond and overcomes the idea of sovereignty within the rigid borders of the nation state, and operates as a description of people's activities that are interdependent, responsible and accountable to each other.

"For us, sovereignty means that you exist in your territories because the others also exist. We don't hold exclusive powers over our land, such thing does not exist, it's self-destructive. We respect it and all forms of life in it too. We depend on the whole. Our sense of soverignty is relational"
(Interview with Domingo Hernández Ixcoy, senior political activist and member of association UK'UX B'E of Mayan nations, Guatemala. 2016)

Energy Sovereignty is furthermore understood as a political territorial project that departs from questioning the imposed energy model and proposes a reconfiguration of power relations in decision-making and knowledge production about energy (Ariza-Montobbio, 2015; Xarxa per la Sobiranía Energética, 2018; Del Bene et al., 2018b). Consequently, it also refers to the plurality of systemic alternatives under way, challenging the dominant energy paradigm controlled by centralized powers. In the words from three activists familiar with three different national contexts:

"We need not only to resist capitalist megaprojects, but also to find different alternatives to meet our needs. However, we had to not only look for an alternative source of energy. We do not want to just have an alternative and 'cleaner' source of energy for continuing to do the same. Our reflection was more on what is our life project alternative to capitalism, and starting from that idea let's look for what energy will be sustainable for that, or better said what energy would make it sustainable. We need to get out of the power dynamics of the energy model, as a preventive strategy. These were the reflections we were weaving together with the indigenous compañeros and compañeras of the COPINH in Honduras when Berta Caceres was assassinated."
(Interview with activist of Otros Mundos- Chiapas and Project AlterNatos, Mexico. October 2016)

"We cannot have capitalist alternatives to capitalist destructive plans. We have seen the nefarious consequences of the liberalization policies and cultural shift in the energy and water sector in the '90s. We have come up with a series of principles for these alternatives. They have to be community-based, decentralised and promote energy autonomy, but also diversified as

we cannot have 'one solution' for all, 'one technology'. They should also be oriented at decreasing energy consumption. Otherwise these alternatives would only replicate the current system in a different way, but will not lead to any transformation"

(Interview with leader activist of Rios Vivos, Colombia, 2015)

Unlimited growth and consumerist culture is incompatible with a finite world. We call for an urgent paradigm shift, from the currently dominant model of consumption-led development, to creating frameworks of human and ecological well being. This transition should be defined by the principles of sustainability, equity, and justice.

(Abstract from the declaration adopted at the Bijli Vikalp Sangam, Bodh Gaya, India, 2016)[71]

6.6 Discussion and conclusion

From the struggles against dams and their consequent land, water and energy grabbing, differing visions, life projects, and cosmologies have been articulated. Movements contribute to making them visible, and to create transformative spaces where these can exist and co-exist. This dimension of the resistance not only belongs to anti-dam movements (it is also present in anti-mining, anti-logging, climate justice coalitions, etc). However, as dams often represent the tip of the iceberg of a larger extractivist plan, and impact and disrupt communities and territories within a short time span and over a very large scale, resistance also acquires a multi-scalar dimension and scope. Moreover, as hydroelectric dams are often encouraged by contradictory

[71] In this gathering, the term 'energy democracy' was used. However, the political positioning of the document is very similar to the Latin American context. More on the *Bijli Vikalp Sangam* (Confluence of Energy Alternatives) to be found here: http://www.kalpavriksh.org/index.php/13-home/386-announcement-towards-energy-democracy-statement-of-bijali-vikalp-sangam

discourses of sustainability and renewable energy, the opposition is correspondingly articulated accordiing to a discourse of alternative energy sources. Thus, a more radical questioning of supposed solutions to climate change is awakened, and the construction (or defense) of alternative visions and projects becomes more nuanced.

Generating such questioning and an overall critique of the energy and water management mode whilst avoiding NIMBY reactions and closures of communities implies a level of political awareness that does not necessarily pre-exist the confrontation; on the contrary, it's often an outcome of it. It's often through and thanks to the resistance that more refined and in-depth diagnoses can be drawn. In the words of Bettina Zuñiga Cacéres, talking about the COPINH experience in Honduras:

"We were facing multiple mining concessions and dams coming up in our territory. Our Lenca people met together to discuss, to prepare actions, to study the political context and our overall response to it. We departed from mining and hydropower, but we finally realised the penetration of projects in our territory had to do with colonialism more generally, with patriarchism, as well as with the imposition upon us of ideas of wellbeing, education and even health, that have profound roots. So we realized we needed to go beyond extractivist projects. We revived traditional indigenous knowledge and health practises, medicines, etc. We reconnected with our sense of the territory, culture and spirituality in a much broader sense."
(Abstract from Cacerés' speech in public meeting in Barcelona, 2016)

The Lenca experience in Honduras is an example of how issues such as health, education, food diversity, human rights, and sacred commons entered the political and confrontational debate as strictly interrelated to the dam.

Without free rivers, for example, community health is also undermined. Mega infrastructure projects entering into the community would imply not only displacing people, but also altering social bonds, disconnecting them from the rest of the environment with their complex relations. Therefore, tapping and diverting waters for electricity is not only an energy issue for energy experts, but it is everybody's affair. Energy and water management are therefore brought back to people's domain and re-politicized, meanwhile endemic visions and hydro-social territorialities are acknowledged and redeemed (Boelens et al., 2016).

By questioning energy beyond the domain of experts, and together with impacted actors, anti-dam movements increasingly call for a systemic ideological shift, out of the paradigm of 'development', 'progress', or 'modernity' (Escobar, 2008). They potentially activate the cycle for sustainability transitions, or transformations, proposed by Scheidel et al (2017) through the reconfiguration of socio-metabolic patterns in an ecologically a culturally sound manner.

To do so, they attempt to make the resistance 'scale out' across the sectors of land/agriculture, water and energy, in order to better strategize among different groups and overcome sectionalized work. Then, they contribute to the questioning and redefinition of 'impacts' in order to include different collectives as agents of the ideological shift, and acknowledge their specific needs and potential. They thus also shift the focus of the debate from dam-affected people, to the those diversely affected by the energy model as a whole. Finally, they engage in a pluralistic epistemic struggle over the ways we learn and know about land, water and energy, embedded 'relational ontologies' and pluralist cosmovisions, and how community legitimately dreams about and acts upon their 'life projects' in their own territories as a counter strategy to dispossession and displacement.

Movements' politics and strategies are processes of political diagnosis and prognosis, achieved through correcting past actions, learning from errors, learning together, scaling out to and cross-pollinating with other activist groups and communities in resistance. This chapter has attempted to draw common tendencies and features of anti-dam movements for transformational politics and for the construction of alternatives, that are able to weave together multiple and pluralistic types of sovereignties upon land, water and *energies*.

Within this plurality, there are divergences between the movements which are beyond the scope of this study. This would require a different positioning on the part of the researcher, for the sensitivity of the issue and its possible political implications, especially at this political momentum of difficult alliances between sections of the society, and confrontation with powerful forces is becoming tougher and even more violent. Despite acknowledging it is an interesting dimension of the problem, for the time being we decided to avoid engaging in this way.

Finally, this chapter is also an attempt to inquire into trends of transformations, in those cases where they do not necessarily happen in specific sites, communities, locations, projects, but are instead to be found in *processes,* which are often transnational. We hold that analysis at this scale is as relevant as local cases and initiatives, and we call on researchers and academics to engage more in this effort, possibly with other transnational networks of the global environmental justice movement.

Somos Comunalidad, lo opuesto a la individualidad,
somos territorio comunal, no propiedad privada;
somos compartencia, no competencia;
somos politeismo, no monoteismo.
Somos intercambio, no negocio;
diversidad, no igualdad, [...]
Somos interdependientes, no libres.
Tenemos autoridades, no monarcas.

Jaime Martínez Luna,
"Eso que llaman Comunalidad"

7. Conclusions

The chapters of this thesis have examined different aspects, dimensions and scales of the expansion of hydroelectric dams and related contentious opposition. Different methodologies were adopted, ranging from fieldwork and participatory mapping for regional analysis of valuation languages, to global co-produced mapping and comparative political ecology, to activist-led research into politics and strategies for transformations with anti-dam movements. In this concluding chapter, the main lessons learnt are laid out, as well as three major highlights. Next, future research areas and projects that spring out of the thesis will be presented.

7.1 Summary and main lessons learnt

Chapter Two showed that **hydropower development** underwent an **industrial expansion** across the globe, significantly starting from the 1950s and 1960s, which was spotted by large mobilization and high social and ecological controversies, including massive displacement. These mobilisations led to the creation and **consolidation of large anti-dam movements**, which later formed nation-wide and international networks and coalitions. After a modest lull in the public sector in the 1990s and 2000s, the hydropower sector is today undergoing a new boom in construction worldwide under the supposed **sustainability** of hydroelectricity and the pursuit for a transition to green energy, with new private and public actors involved, including China and the climate change finance. New contentious scenarios are being opened in new regions, which makes it important to expand research on related socio-environmental conflicts. Particularly

targeted are the regions of the Amazon and La Plata basins in Brazil, the Andes, the Yangtze basin in China, the Balkans, and several regions in Turkey, South East Asia, and the Himalayas.

Next, the chapter also provided figures that question and problematise the discourse of renewable hydropower as an energy source for the **transition** to a more sustainable economy. The overall declining percentage of hydropower generation in the total share of the world energy portfolio raises the question is hydropower supposed to lead such a transition from fossil fuels to renewables or is it instead going to be an additional source for the increased amount of energy required by the world growing economy? The chapter finally held this question as particularly relevant in a scenario of increasing investments into the renewables sector, which will have massive implications in terms of **infrastructure building and interconnections** across countries and continents.

Chapter Three made the point for **co-production of knowledge** and **activist-led research** as precondition to inquire into the complexity and multiple scales of ecological conflicts. It also argued that such an approach allows not only for ground-up knowledge collection but also the collectivly co-produced framing of the problem and therefore of the research question.

Chapter Four made the case against an ongoing **'extractivism of renewables'** namely how renewables expansion replicates similar patterns of the social and environmental impacts such as the extractivist activities. It analysed impacts and dynamics of the expansion of the **hydropower commodity extraction frontier** in the Himalayan state of **Himachal Pradesh (India)**, and the valuation languages of communities protesting and resisting the disruption of their environments. The research showed that,

whereas the hydropower industry had first targeted major rivers to build large plants, it is now also turning to smaller dams and run-of-river projects on smaller streams legitimised by the discourse of green energy. However the number of plants and related infrastructure multiplies, turning river basins into 'sacrifice zones' (Lerner, 2010) for the generation of hydropower. This research suggests that such expansion can be analysed through the lens of an **'extractivist imperative'** (Arsel et al., 2016) in that it locks in policies, governments, and communities into an ecologically and socially disruptive dam construction as do other extractivist industries such as mining or oil extraction. If these latter do so in the name of national development, renewables adquire an additional 'teleological primacy' (to use the words of Arsel et al (2016)) namely maximizing 'green energy' and in this way securing power provision in supposedly energy transition scenarios. It is argued that a **'renewability imperative'** leads today not only to a rapid construction of renewables megaprojects but also of plants smaller in size but at large geographical scale. The result is twofold: an increased potential of hydropower installed, which adds to other sources of energy like coal or nuclear, and a construction sector also on the rise. Both are supported not only by a 'consensus of commodities' (Svampa, 2013), in this case electricity, but also, and complementary, by a **'consensus of infrastructures'** that underpins and is justified by the expansion of large scale renewables, despite social and ecological impacts.

In all cases, projects lack democratic control and participation in decision-making. By analysing the **valuation languages** of mobilized groups (Martínez-Alier et al., 2010), the chapter argued that while the Himalayan mountain region is turned into new commodity extraction frontier and thus marginalised sacrifice zones, communities struggle to keep them at the core of a healthy economy and vibrant cultural life. They oppose to the forced reordering of their territories and disruption of socio-ecological integrity, the

loss of wildlife sanctuary and spots of spiritual value. Their demonstration actions span from sit-ins at dam sites to legal action to reclaim their rights and expose the violence and criminalization they face, to community-based research, for instance on the dried-up water springs. They finally question the notion of development imposed to them and eventually the paradigm of economic (and energy) growth.

Chapter Five presented the results of the analysis of the total EJAtlas database on conflicts (220 cases) related to hydroelectric dams globally as per February 2017. It adopted quantitative and descriptive statistical analysis of the: actors mobilising; social, environmental and health impacts that motivate their opposition; forms of mobilization; and state and corporate violent responses namely **repression of protests, criminalisation, violent targeting specific activists, and assassinations**. The chapter mobilized a **comparative political ecology** approach in order to go beyond individual case studies and be able to draw global trends.

It showed that hydropower projects are **highly conflictive**, and that opposition to these projects is routinely repressed with violence. It found that in non-Indigenous territories, criminalisation appears to be the first strategy to curb dissent, while in **Indigenous territories** violent repression becomes the most frequent one. Is direct violence most replicated where the abundance of unexploited natural resources, state and corporate impunity, and historical racism continue to replicate conditions of colonialism, such as in Indigenous lands? The results also showed mobilized groups are mostly those that directly depend on their environments, which reflect the environmentalism of the poor thesis, and that forms of mobilization and protest are generally non-violent. The chapter finally suggest that violence and repression can be considered as a deliberate strategy for **'re-ordering the territory'** (Ceceña, 2009), and to undermine the emergence of alternative visions,

epistemologies, world-views, also referred to as the '*pluriverse'* (Escobar, 2008, 2017; Shrivastava and Kothari, 2012) thus it could be reffered to as '**cognitive violence'** (Grosfoguel, 2016) or '**extractivist violence'**. Inquiry into these sensitive topics represents a big challenge also for engaged scholars; therefore, the chapter finally called upon increased efforts in sustainability studies for co-production of knowledge between academics and grounded communities to collectively pursue more cognitive and epistemic justice on such delicate issues, and upon increased focus on environmental justice movements as **forces for transformations** and for protection of **pluralistic visions of sustainability** (Temper et al., 2018a).

Chapter Six discussed **transformative forces within anti-dam movements**. It is grounded on empirical evidence retrieved from activist-led research with international and national networks of anti-dam movements. It argued that the resistance is not only about rejecting and opposing unwanted projects in specific territories, but also about defending and creating different visions and understandings of the environment and its resources. The chapter argued that the **grabbing of land, water and energy** by hydroelectric dams finally entails also the **grabbing of local sovereignty** over territories. Mobilised communities express their opposition not only in the rejection of specific projects but also by articulating alternatives with national or international networks. As dams are only the tip of the iceberg of a larger extractivist plan, the response of communities and EJOs acquires a multi-scalar dimension and scope.

The chapter showed how this is expressed through a process of **'scaling out' of the resistance** across the sectors of land/agriculture, water and energy, in order to better strategise among different groups and overcome sectionalized work. Secondly, movements demand that the **concepts of 'impacts' and 'affected people' be expanded**: not only one single project causes impacts

over a specific localised community but a whole national energy model produces different types of impacts upon rural and urban areas and upon different social groups. This implies that the search for 'alternatives' is not only expressed through local counter-proposals to one specific project, but also through the claim for larger systemic transformations. Finally, the chapter argued that anti-dam resistance also include an **epistemic struggle** over the ways we learn and know about land, water and energy, and the defense of 'relational ontologies' and pluralist cosmovisions (Escobar, 2016; de Sousa Santos, 2014).

7.2 Key highlights

Three major highlights drawn from this thesis are further emphasised here below:

- **Hydropower as political power and an extractivism of renewables**

The growing number and intensity of ecological conflicts around hydropower dams indicate the political character of this energy technology. The discourse of sustainability, renewable energies and urgent energy transition are today leading to a fast pace of expansion of hydropower along new commodity extaraction frontiers. Under this discourse, environmental regulations and safety standards are being relaxed, meanwhile social distress, ecological disruption and violence increase. Concerns include the lack of democratic debate of how much energy, by whom, for what and how it should be generated. We can therefore make the hypotesis of an extractivist character of large-scale renewables expansion.

- **Direct, epistemic, cognitive and extractivist violence**

Violent repression targets not only individual protesters and does not only repress open demonstrations (direct violence), but also aims at curbing and delegitimising different ways of knowing (epistemic), cosmovisions (cognitive), 'life projects' and diverse political ontologies that express themselves in plural and incommensurable valuation languages (extractivist). As much as other extractivist activities, imposed large-scale renewables also cause a re-ordering of the hydro-social territorialities for mega-projects. Anti-dam movements oppose not only specific projects but also an imposed, undemocratic and destructive industrial capitalist accumulation.

- **Anti-dam movements as transformative forces for new sovereignties**

Resistance is not only reactive but also pro-active and propositive. In response to overall sovereignty grabbing (through grabbing of land, water, energy sources), anti-dam movements have progressively articulated actions around systemic and paradigm shifts. The call for energy sovereignty has emerged as one of the leading slogans and political projects with the aim of questioning the overall energy model and territorial control and sovereignty by diverse and plural communities.

7.3 Final thoughts and future research

During the research for this thesis, several other concepts, approaches and issues have emerged that could not be included. Some of them are of particular interest to me and I wish to list them here as potentially future areas of work.

First, small hydropower (with RoR design or other types) can still be a democratic, non-conflictive, and truly sustainable technology for electricity generation in a desired scenario of energy transformation away from fossil fuels. However, we need deliberative tools to establish under which conditions and regulations. The study of impacts of hydroelectric dams have recently adopted more comprehensive tools, including the cumulative impacts assessment which analyses not only individual plants but the overall impacts of several projects on a river and main tributaries (in some cases even basins). Cumulative impacts should look at both environmental and social issues of all projects on the same river stretch and the interaction between them (Kelly-Richards et al., 2017). The framework of **ecosystem and cultural ecosystem services** could be considered as potentially powerful conceptual and methodological tools for this endeavour, in a co-generated effort with local inhabitants (Fish et al., 2016; Hanaček and Rodríguez-Labajos, 2018). A cumulative impacts assessment was carried out in 2015 in Himachal Pradesh on the river Satluj. The results were criticized by Himdhara, who laid out the main weaknesses of the study (as discussed in Chapter Four). Yet, under specific conditions, methodological robustness and transparency, this could be an interesting tool to apply in other river basins in joint studies involving local communities in order to address both the ecological and the cultural dimension of impacts.

Second, there is still confusion about the conceptualization of renewable energy. If technically the distintion between renewables and fossil fuels is clear, the political, social, ecological, and territorial implications of renewables are less known. Criticising renewables in a context of climate change might therefore cause misunderstanding. Further research should highlight conflictive aspects of existing renewables (not only hydropower, but also wind, solar, geothermal and waves) under comparative lens across countries combined with analysis of national and international policies for

renewables. This would be an important contribution to the literature on **energy transition** (Avila-Calero, 2018; Burke and Stephens, 2018; 2017; Bridge et al. 2013) and **energy justice** (Sovacool and Dworkin, 2014; Jenkins et al., 2016; 2018), for critically engaging with the definition of 'transition' and 'right to energy'. One central aim will be to investigate into convergences and difference of these two concepts and the activist slogan of **energy sovereignty**. While all three advocate for a phasing out of fossil fuels and for more promotion of renewables, they mobilize and emphasise different concepts and dimension of this change. How do they address the controversial territorial implications of renewables? How do they problematize the underpinning social metabolism and capitalist regime? How do they respond to the ecological modernization paradigm where the low carbon economy appears as an effort for 'greening' the current energy model without questioning the societal structures of injustice and accumulation behind them? What scenarios do they draw? What space do they create for a **post-extractivist economy**?

Third, my current committment with the EJAtlas project includes the expansion of the database of dam conflicts and interlinking of rivers (for hydropower, but also for water storage and deviation). I am particularly interested in the inclusion of those conflicts that have registered high levels of violence, including assassinations. This could be done in collaboration with other organizations (for instance, International rivers and Global Witness) to ensure robustness and exhaustiveness of data for what could become the largest **world inventory of dam and river infrastructure conflicts**.

Forth, as I argued in Chapter Six, ecological conflicts and resistance to unfair policies can also generate alternative projects and paradigm shifts within a community. Literature on energy sovereignty, energy democracy or energy

justice contributes to analysing such processes. My interest in the future is to further research on community-based transformations, especially in rural areas. What motivated people to undertake these projects? What were the technical and political opportunities favorable to that? What are the constrains? How is the community itself impacted by the project, what have been the internal implications? How is sovereignty defined and practised in these contexts? How does it engage with the nation-state centred concept of sovereignty and how does it expand beyond it, in a relational sense (Stacy, 2003; Smith, 2005; D'Arcangelis, 2010)?

During my doctorate, I learnt about interesting initiatives around small and community-controlled hydropower in Himachal Pradesh and Uttarakhand (India), in Chiapas (Mexico) and in Brazil, remunicipalization demands for hydro plants in Catalunya (Spain) and Italy, community-run small solar parks in Alberta (Canada), wind turbines in Greek islands, to name a few. Concepts sich as sovereignty, autonomy, municipalism and cooperativism among other, are mobilized and reclaimed for relocalising the scale of decision making and control, for enhancing and strengthening the relation with the territory, but without necessarily excluding others and enclosing into small selfish communities. The **relational dimension** is instead emphasized. This line of research could contribute to the further conceptualization of a **transformative environmental justice** and its relational dimension, namely those processes of resistance that lead to **radical ecological transformations** (Shrivastava and Kothari, 2012; Temper et al., 2018b) and **inclusive interrelatedness**.

Reference	Name of Project	Country	River	Companies&Financers[72]	Status
EjAtlas (2014a)	**Sivens Dam**	France	Tescou	Compagnie d'Aménagement des coteaux de Gascogne (CACG) from France European Agricultural Fund for Rural Development (EAFRD)	Stopped
EJAtlas (2014b)	**Panchet Dam and the Damodar Valley Project**	India	Damodar	Damodar Valley Corporation (DVC) from India	In Operation
EJAtlas (2014c)	**Myitsone dam**	Myanmar	Irrawaddy river	China Power Investment Corporation (CPI) from China Asia World Company from China Myanmar Electric Power Enterprise from Myanmar	Proposed
EJAtlas (2014d)	**Diamer Bhasha**	Pakistan	Indus	Lahmeyer from Germany AECOM from Canada Mott MacDonald from India China Three Gorges Corporation (CTG) from China Asian Development Bank (ADB) The World Bank (WB) US Agency for International Development (USAID) Inter-American Development Bank (IADB)	Under construction
EJAtlas (2015a)	**Kariba Dam**	Zambia/ Zimbabwe	Zimbesi	Salini Impregilo from Italy Federal Power Board of Rhodesia and Nyasaland The World Bank	In operation
EJAtlas (2015b)	**Chixoy Dam**	Guatemala	Rio Negro	Union Fenosa from Spain Sacyr from Spain Cogefar from Italy Hotchief from United States of America SISBORIS from France The World Bank (WB) Inter-American Development Bank (IADB)	In operation
EJAtlas (2015c)	**Yacyreta Dam**	Argentina-Paraguay	Parana	Sacyr from Spain Dumez from Argentina Entidad Binacional Yacyreta (EBY) from Argentina The World Bank (WB) Inter-American Development Bank (IADB)	In operation
EJAtlas (2015d)	**Vajont Dam**	Italy	Vajont	ENEL Group from Italy TORNO s.p.a. from Italy Società Adriatica di Elettricità (SADE) from Italy	Not more in use
EJAtlas (2015e)	**Hydroaysén**	Chile	Backer and Pasqua	HidroAysen from Chile Colbun from Chile ENEL Group from Italy Endesa from Spain Transelec China National Water Resources and Hydropower Engineering Corp. Brookfield Asset Management from Canada	Suspended

[72] The list of companies and financers might be not exhaustive. It includes construction companies, dam owners, relevant component suppliers, and financers that have been involved in the project or in the conflict at any phase of the project (planning, construction, operation, etc).

EJAtlas (2016a)	**Agua Zarca Dam**	Honduras	Gualcarque	Desarrollos Energéticos S. A de C.V (DESA) from Honduras Concreto Preesforzado de Centroamérica SA (Copreca) from Costa Rica Voith Hydro Holding GmbH & Co. KG from Germany Sinohydro Corporation Limited (Sinohydro) from China Financiera Comercial Hondureña SA (FICOHSA) from Honduras Central American Bank for Economic Integration Corporación financiera Internacional	Under construction
EJAtlas (2016b)	**Urra Dam**	Colombia	Sinu	URRA S.A. E.S.P. from Colombia	In operation
Ejatlas (2016c)	**Hidroituango dam**	Colombia	Cauca	Camargo Correa S.A. from Brazil Conconcreto S.A. from Colombia Coninsa-Ramón H S. A. from Colombia MINCIVIL S.A. from Colombia ESTYMA S.A. from Colombia SP INGENIEROS S.A. from Colombia Ingetec-Sedic from Colombia Sainc Ingenieros Constructores S.A. from Colombia AIA Arquitectos e ingenieros asociados	Under construction (currently suspended due to high risk of collapse, June 2018)
EJAtlas (2016c)	**Akosombo Dam**	Ghana	Volta	Impregilo from Italy Volta Aluminum Company (VALCO) from Ghana Kaiser Aluminum from United States of America The World Bank from United States of America International Bank For Reconstruction And Development (IBRD)	In operation
EJAtlas (2016d)	**Sardar Sarovar Dam**	India	Narmada	Narmada Valley Development Authority from India Sardar Saroval Narmada Nigam Ltd from India The World Bank	In operation
EJAtlas (2016e)	**Maheshwar Dam**	India	Narmada	Shree Maheshwar Hydro-Electric Power Corporation Ltd (SMHPC) from India Bayernwerk from Germany Siemens from Germany Vereinigten Elektrizittswerke Westfalen AG (VEW) from Germany PacGen Ogden Corporation from United States of America The World Bank Power Finance Corporation (PFC) from India International Finance Corporation	Suspended
EJAtlas (2016f)	**Ralco HEP and Bio Bio Watershed hydro plans**	Chile	río Bío-Bío	Endesa (Endesa) from Italy ENEL Group (Enel) from Italy	In operation
EJAtlas (2016g)	**Hidroeléctrica El Naranjal**	Mexico	río Blanco	Hidroeléctrica El Naranjal from Mexico Agroetanol de Veracruz S.R.L de C.V from Mexico	Planned

EJAtlas (2016h)	**Hidro Santa Rita**	Guatemala	río Dolores	Energía Limpia de Guatemala (ELG) from Guatemala Grupo Finco from Guatemala Hidroeléctrica Santa Rita, S.A. from Guatemala Grupo Terra from Guatemala Latin Renewables Infrastructure Fund (LRIF) The World Bank (WB) International Finance Corporation	Under construction
EJAtlas (2016j)	**Gran Inga**	Democratic Republic of Congo	Congo	Sinohydro Corporation Limited (Sinohydro) SNEL from Congo, Dem. Rep. Grupo ACS from Spain Eurofinsa from Spain The World Bank United States Agency for International Development African Development Bank (AfDB) French Development Agency (AFD) from France European Investment Bank (EIB) Development Bank of South Africa	Proposed
EJAtlas (2016k)	**Trans-Sibirskaya**	Russia	Ahilka /Amur	China Yangtze Power Co (CYPC) from China Eurosibenergo (EN+) from Russian Federation China Three Gorges Corporation (CTG) from China Export-Import Bank of China	Proposed
EJAtlas (2016l)	**São Luiz do Tapajós**	Brazil	Tapajós	Centrais Elétricas do Norte do Brasil S/A (Eletronorte) from Brazil Electrobras from Brazil Construções e Comércio Camargo Côrrea S/A from Brazil EDF Consultoria em Projetos de Geração de Energia Ltda from Brazil Electricité de France International (EDF) from France Siemens from Germany	Suspended
EJAtlas (2017a)	**El Quimbo**	Colombia	Magdalena	Endesa from Spain EMGESA S.A. E.S.P. from Colombia Empresa de Energía de Bogotá from Colombia ENEL Group from Italy Inter-American Development Bank (IADB) European Investment Bank (EIB)	In operation
EJAtlas (2017b)	**Angostura**	Chile	río Bío-Bío	ENEL Group from Italy Colbun from Chile Salini Impregilo from Italy Endesa Chile from Chile Endesa from Spain	In operation
EJAtlas (2017c)	**Hidroelectricas en San Mateo Ixtatán (Pojom I, Polojom II y San Andrés o Yalanhuitz)**	Guatemala	ríos, Pojom, Negro, Primaver, Varsovia y Palmira	Promoción y Desarrollo Hídrico, S.A (PDHSA) from Guatemala SOLEL BONEH from Israel Generadora San Mateo, S.A. from Guatemala Generadora del Río, S.A. from Guatemala Generadora San Andrés, S.A. from Guatemala Energía y Renovación Holding S.A (ERH) from Panama Hidralia Energia from Spain Banco Interamericano de Desarrollo (BID) Banco Centroamericano de Integración Económica	In Operation
EJAtlas (2017i)	**Proyecto hidroeléctrico Corpus Christi**	Argentina-Paraguay	río Paraná	Consorcio HARZA-IATASA TECMA from Argentina Unión Industrial Argentina (UIA) from Argentina Knight Piésold (KP) from United States of America	Stopped

EJAtlas (2017j)	**Site C dam**	Canada	Peace	BC Hydro from Canada	Under Construction
EJAtlas (2017k)	**Banquiao dam**	China	Huai	N/A	Repaired and now back in operation
EJAtlas (2017l)	**Gibe 3**	Ethiopia	Omo	Salini-Impregilo from Italy Ethiopian Electric Power Corporation (EEPCo) from Ethiopia Tebian Electric Apparatus Stock Co., Ltd from China Organisation for Economic Co-operation and Development (OECD) Development Assistance Group (DAG) from Ethiopia The World Bank Industrial and Commercial Bank of China (ICBC) from China	In operation
EJAtlas (2017m)	**Tehri**	India	Bhagirathi	Tehri Hydro Development Corporation (THDC) from India Jaypee Group from India The World Bank	In operation
EJAtlas (2017n)	**Ilisu (and Southeastern Anatolian Project)**	Turkey	Euphrates	Sacyr from Spain Alstom from France Zblin AG from Germany Balfour Beatty LTD Skanska from Sweden Colencob from Switzerland Stucky LTD from Switzerland Maggia from Switzerland Celikler from Turkey Dolsar rom Turkey Andritz Group from Austria Nurol-Cengiz from Turkey Rast from Turkey Temelsu from Turkey Akbank from Turkey Creditanstalt from Austria DekaBank from Turkey GarantiBank from Turkey Oesterreichische Kontrollbank Aktiengesellschaft (OeKB) from Austria Sace from Italy SERVfrom Switzerland Euler Hermes SIAC from Germany Societe Generale (SGA) from France UBS from Switzerland Gruppo Unicredito Italiano from Italy	Planned
EJAtlas, 2017o	**Dardanelos**	Brazil	Aripuanã	Energética Águas da Pedra S/A from Brazil Centrais Elétricas do Norte do Brasil S/A (Eletronorte) from Brazil Neoenergia Investimentos S/A (Neoinvest) from Brazil Odebrecht Ambiental from Brazil Companhia Hidro Elétrica do São Francisco (Chesf) from Brazil Banco Nacional de Desenvolvimento Econômico e Social (BNDES) from Brazil	In operation

EJAtlas (2018a)	**Silent Valley Project**	India	Kunthipuzha	N/A	Stopped
EJAtlas (2018b)	**Bui Dam**	Ghana		Bui Power Authority from Ghana Sinohydro Corporation Limited (Sinohydro) from China China Exim Bank	In operation
EJAtlas (2018c)	**Kamchay Dam**	Cambodia		Sinohydro Corporation Limited (Sinohydro) from China China ExIm Bank	In operation
EJAtlas (2018d)	**Kunlong Dam**	Myanmar	Salween	Gold Water Resources Co. Ltd from China Hanergy Holding Group Ltd. from China Asia World Group Myanmar from Myanmar Kunming Engineering Corporation Limited from China Biodiversity and Nature Conservation Association (Banca) from Myanmar Khiti Engineering Institute from China	Under Construction
EJAtlas (2018e)	**Pulangi V Dam**	Philippines		NAPOCOR from Philippines First Bukidnon Electric Cooperative Inc. (FIBECO) from Philippines	Planned

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