THE IMPACTS ON LIVELIHOODS AND SOCIAL CAPITAL FROM DAM-INDUCED RESETTLEMENT: A GLOBAL REVIEW

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ABSTRACT

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Large hydroelectric dams have been constructed at a rapid rate throughout the Global South in recent years. This dam boom has led to the resettlement of millions of people who are removed from their ancestral land and are often not compensated adequately for their lost resources. Post-resettlement, households and communities experience a host of changes, often negative, which lead to a decreased standard of living and wellbeing. In this research, I am interested in the changes to livelihoods and losses to social capital that resettled communities face. I conducted a meta-analysis of peer-reviewed articles of large hydroelectric dam-induced resettlement cases in the Global South published from 1980 to 2019. To do so, I, along with three other students, developed a codebook to analyze the implications of dam-induced resettlement across 101 cases that covered 50 dams in 21 countries. The results show changes in 90 cases in at least one of the five categories (natural, physical, human, financial, and social) that I use to define livelihoods. The most common ways livelihoods decline include the loss of natural capital such as land, decreases in soil quality, changes to food access, decreases in income, and the abandonment of fishing and farming. In 23 cases, social capital decreased which was often the cause of a litany of compounding issues including: increases in conflict and ethnic tension, decreases in income, declines in mental health, and loss of culture heritage. As large dam construction continues to boom, it is imperative to think about ways in which this process can be more sustainable. By improving the resettlement process, we can help to help mitigate the negative changes to livelihoods that the resettled face.

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KEY TO ABBREVIATIONS

GW Gigawatts

SIA Social Impact Assessment

RAP Resettlement Action Place

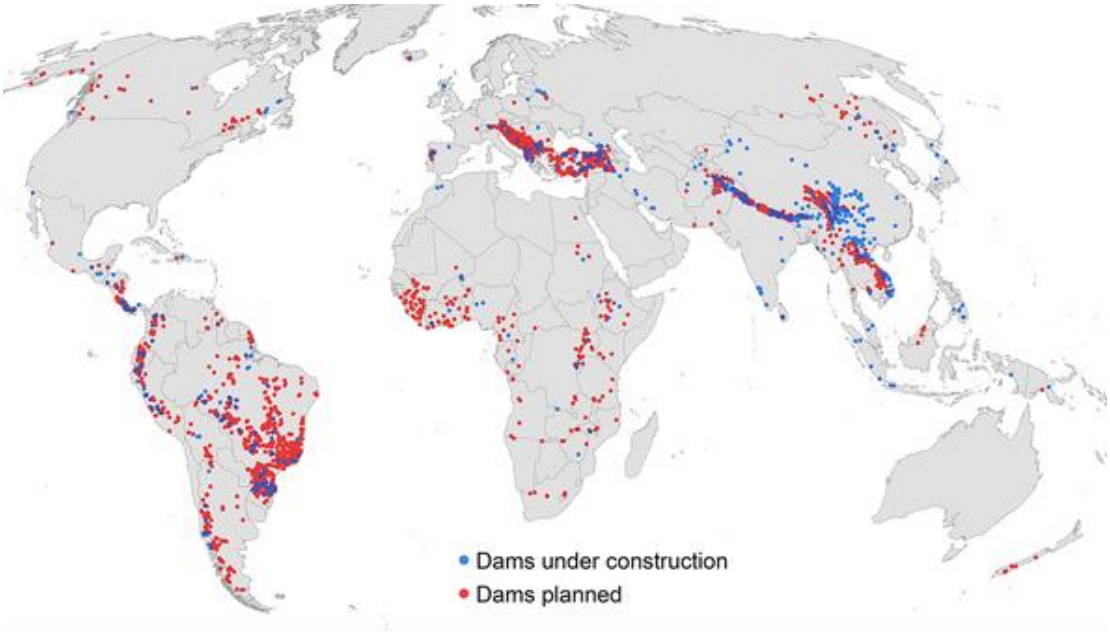
WCD World Commission on Dams

1. INTRODUCTION AND BACKGROUND

Large hydroelectric dams have been constructed at a rapid rate throughout the Global South in recent years. An estimated 3700 large dams were either planned or under construction throughout the world in 2015 (Zarfl, Lumsdon, Berlekamp, Tydecks, & Tockner, 2015, Figure 1). In 2017 there were 1267 gigawatts (GW) of hydropower installed capacity around the globe with the biggest gains in capacity in China, Brazil, and India (International Hydropower Association, 2018). In fact, 21.9 GW of capacity were added just in 2017 so that now 16.4 percent of global electricity is produced from hydropower (International Hydropower Association, 2018). Though large dams throughout North America and Europe have rarely been built since 1975 and are often now being removed, dams have been constructed at an increasing rate in the Global South for the past several decades (Moran, Lopez, Moore, Muller, & Hyndman, 2018).

Countries in the Global South anticipate that these large dams will provide much needed energy for their burgeoning urban populations and growing industries (Moran et al., 2018). Dam construction activity is currently the highest in the La Plata and Amazon basins in Brazil, the Ganges-Brahmaputra basin in India and Nepal, the Yangtze basin in China, the Congo basin in central Africa, and the Mekong basin in southeastern Asia (Zarfl et al., 2015; Winemiller et al., 2016). When these dams become operational, 25 of the remaining 120 large river systems that remain free flowing will be dammed (Zarfl et al., 2015). Recent research highlights just how rare free-flowing rivers are becoming. In fact, only 23 percent of rivers over 1000 kilometers now flow to the ocean without interruption, and dams and their reservoirs are the most common way that these rivers become fragmented (Grill et al., 2019).

Figure 1. Dams under construction and planned in 2015



Zarfl et al., 2015

According to Scudder (2011), dam construction has led to the displacement of up to 80 million people in the past century through both primary and secondary displacement. Primary displacement occurs when people relocate as part of the dam planning process; it is somewhat predictable and can be mitigated through planning and official resettlement programs (Gellert & Lynch, 2003). Secondary displacement is much less predictable and is rarely planned for, such as when people downstream from a dam must move when fish species they rely on decline (Gellert & Lynch, 2003) or the area flooded by the reservoir is larger than initially foreseen (Moran et al. 2018). These displaced populations are often not compensated adequately for their lost resources and social upheaval that results from forced relocation (Siciliano, Urban, Tan-Mullins, Pichdara, & Kim, 2016; Sabir, Torre, & Magsi, 2017; González-Parra & Simon, 2008). This can lead to a reduction in standard of living and loss of employment among other impacts.

Though downstream and upstream communities experience losses due to a dam's construction (Richter et al., 2010; Castro-Diaz, Lopez, & Moran, 2018), my research focuses on

the many cases of resettlement around the world where communities are relocated when their homes and lands were submerged under a dam's waters or needed for the construction of the dam. The cases in my dataset are focused on communities that were resettled because of the construction of the dam; these communities were slightly upstream of the dam (where the reservoir is filled) or located right where the dam itself is constructed. No downstream communities are included in the dataset. This does not imply that downstream communities are not impacted. Instead they are rarely studied (Castro-Diaz, et al., 2018), and therefore their impacts are not well known. The recommendations of this thesis are relevant for resettled populations, the communities impacted by dams that have been studied the most. But I acknowledge the need to focus on under-studied communities, such as downstream communities.

For the purposes of this research, resettlement is considered part of an official plan put into place by the government or dam authorities to help planned displaced people relocate. Resettled communities are different than displaced communities, because displaced communities are those who are left on their own without government support or compensation to find new homes and territory when theirs were lost during dam construction. Therefore, all resettled people have been displaced but not all displaced people are resettled[1]. In this research, I am especially interested in the changes to livelihoods and losses in social capital that resettled communities face. I aim to uncover which aspects of livelihoods change, how they change, and how often this occurs among resettled populations across dam cases. I define livelihoods as "the assets..., the activities, and the access to these (mediated by institutions and social relations) that

[1] There are, however, cases where "resettled" people were not actually displaced by the dam. Through bribery and other forms of corruption, households were able to secure land, houses, or other forms of compensation in resettlement sites and elsewhere, even though their previous homes were not submerged by the reservoir (Hass et al. 2008). This has been reported in Lesotho, Thailand and Zambia among other countries (Hass et al. 2008). However, none of the cases in this thesis' database reported this type of corruption occurring. Therefore, for this study, all resettled people have been displaced, but not all displaced people are resettled.

together determine the living gained by the individual or household" (Allison & Ellis, 2001, p. 379). Social capital, one asset of livelihoods, comprises "the kinship networks, associations, membership organizations and peer-group networks that people can use in difficulties or turn to in order to gain advantage" (Allison & Horemans, 2006, p.758). I provide a more comprehensive definition and explanation of livelihoods and social capital, and their importance within the context of communities impacted by dams, in the literature review.

My research questions are:

1. Do livelihoods change for households and communities post resettlement? If so, how do livelihoods change and how common are these changes reported across dam sites in the Global South?
2. Does social capital change for resettlement communities? If so, how does social capital change and how common are these changes reported across dam sites in the Global South?

To answer these questions, I conducted a meta-analysis, a study of studies, of resettlement cases due to hydroelectric dam construction throughout the Global South. To do so I, along with a group of three students from Michigan State University, built a database of case studies of dam induced resettlement. We coded each of these studies with measurable variables focused on resettlement and compensation. I then analyzed the variables to uncover trends among livelihoods and social capital across the cases. A full description of this process, including crafting the codebook, building the database, and coding cases, is detailed in the methods section.

This thesis contributes to the literature because though scores of studies have been conducted to identify how communities fare post-resettlement (Randell, 2016; Tilt, Braun & He,

2009; Wilmsen, 2016), few studies have provided a comprehensive analysis of dam impacted peoples across countries. One of the seminal comparative analyses of large dams was completed in 2002 and published in 2005 by Scudder. My research builds on this fundamental work. Scudder (2005) examined the changes to standard of living of resettled people across 50 dams and found an improved standard of living in only three cases (Scudder, 2005). Scudder (2005) coded documents[2] related to these dams and focused on general dam data, resettlement policy issues, information related to his Four-stage Framework[3], resettlement outcomes, and downstream impacts.

My thesis, a meta-analysis of resettlement outcomes focused on the impacts and changes to social capital and livelihoods that resettled communities experience, is a different type of analysis than what Scudder (2005) conducted. His analysis focused mainly on four resettlement outcomes that he categorized into: 1) the majority of the resettled raised their living standards because of project planning; 2) the majority of resettled raised their living standards without help from project planning; 3) living standards are worse for the majority; and 4) living standards worsen, but the resettled were able to benefit from non-project opportunities (Scudder, 2005). There are other important differences between my work and Scudder's. The first difference is with respect to the scope of the cases studies: I focus solely on dams constructed in the Global South.[4] Secondly, I analyzed only peer reviewed journal articles published from 1980 to 2019. I

[2] Along with peer-reviewed journal articles, Scudder included reports from environmentalists, historians, and social scientists; PhD dissertations; reports from the World Bank's Operations Evaluations Department from 1993, 1998 and 2001; and case studies by the World Commission on Dams (WCD).
[3] Scudder's (2005) Four-stage Framework is a behavioral and predictive model focused on how the resettled are most likely to behave if adequate opportunities are available for them to benefit from the dam's construction. According to Scudder, the resettled rarely make it past stage 2. The stages are as follows. Stage 1: planning for resettlement before removal. Stage 2: resettlement and dealing with the initial loss of standard of living. Stage 3: community and economic development that leads to an increased standard of living for the first generation of resettled. Stage 4: the handing over of sustainable resettlement processes to the second generation of resettled.
[4] Of the 50 dams surveyed in Scudder (2005), six dams were in the US, one was in Norway, and one was in Canada.

have narrowed the analysis to only include dams in the Global South as this is where large dams are being constructed today. This contrasts with the Global North where many dams are now being removed (Moran et al., 2018). Narrowing the scope conditions in this way will help highlight the unique issues resettled communities face in the Global South.

Another difference of this study compared to Scudder (2005) is theoretical. Scudder focused on five of the eight impoverishment risks developed by Cernea (1996) in his Impoverishment Risks and Reconstruction Model. One of the impoverishment risks not utilized in Scudder's survey was social disarticulation which occurs due to a loss of social capital. In a footnote, Scudder pointed out that the "inability or unwillingness of project authorities to resettle people in communities and social units of their choice" was a problem in 15 of the dam cases (p. 329). Thus, I will include a focus on social capital in my analysis as this is a common problem faced by dam resettled peoples (Bisht, 2009; Abrampah, 2017; González-Parra & Simon, 2008; Nguyen, Pham & de Bruyn, 2017).

At the end of his comparative case study, Scudder (2005) provided several recommendations for dam authorities to help communities retain and even improve their standard of living post-resettlement. Based on his research, he called for a single project authority to be responsible for both the construction of the dam and the Resettlement Action Plan (RAP) instead of a consortium of government groups and private companies. He reiterated the importance of pre-project assessments such as Social Impacts Assessments (SIAs) in order to accurately identify the number of people who will need to be relocated as under-counting resettled households is a leading cause of not setting aside enough money for the resettlement process (Scudder, 2005). More information on how RAPs and SIAs are typically conducted, and how they fit into the context of the resettlement process will be provided in the literature review.

Finally, Scudder (2005) recommended incorporating the host populations in the RAP in order to mitigate potential conflicts between hosts and the resettled. As will be shown in the results of this study, in many cases these recommendations are not heeded today. Dams construction and RAPs are often managed by a hodge-podge of entities, SIAs may be rushed or shoddily conducted, and conflict between host communities and the resettled remains common (Kleinitz & Naser, 2011; Morvaridi, 2004; Égré & Senécal, 2003; Xi, 2016; Heggelund, 2006). Therefore, this research aims to provide further recommendations, that build off those offered by Scudder (2005) and other researchers, for dam authorities based on the evidence from this thesis of how the livelihoods and social capital change for the resettled. This research also provides recommendations for future research among resettled communities focusing especially on how social capital changes post-resettlement. The rest of this thesis will be divided into the following sections: 1) a literature review detailing the social and ecological impacts of hydroelectric dams, how the resettlement process is typically conducted, and definitions of livelihoods and social capital; 2) the methods of the meta-analysis including building a database, creating a codebook, and the coding process; 3) the discussion including how livelihoods and social capital were impacted among the cases and recommendations for dam authorities and future research; and 4) the conclusions of this study.

2. LITERATURE REVIEW

The literature review is composed of five sub-sections. Sub-section 1 provides a summary of the ecological and social impacts of hydroelectric dam construction and operation. In sub-section 2, I give an overview of dam induced resettlement. Sub-section 3 describes the resettlement planning process and provides examples from case studies highlighting how the resettled fare when this process does not go smoothly or when post-resettlement support is not put into place. In sub-section 4, I define livelihoods and how this definition fits into resettlement cases, and finally in sub-section 5, I define social capital and why it is the foundation of livelihoods for the resettled.

2.1 Overview of ecological and social impacts of dams

When a hydroelectric dam is constructed on a river a reservoir is created, and the water stored in the reservoir generates energy as the water flows pass turbines. The filling of the reservoir floods adjacent land (which could include natural and human developed landscapes). Though hydroelectric dams are often promoted as a sustainable answer for energy provision, research has shown that depending on the size and location of the dam, the dam may be far from carbon neutral (Vilela & Reid, 2017; Giles, 2006; Fearnside, 2016). Vilela and Reid (2017) developed a HydroCalculator to measure the greenhouse gas emissions of dams to determine if they cancel out the energy the dam creates; the authors found that in many cases it may take years or even decades for a dam to be considered a carbon neutral energy source. This is often because methane is created when flooded vegetation decomposes in the water of a reservoir (Fearnside, 2016). When this water flows through the turbines in the dam, the methane, which

has twenty times the global warming impact of carbon dioxide over 100 years, is released into the atmosphere (Giles, 2006).

Beyond the release of greenhouse gases, large dams damage the environment in myriad ways. These impacts include: loss of forest cover as reservoirs fill with water, loss of sediment deposits (as they become trapped in the reservoir), downstream nutrient loss and erosion due to the trapped sediments, declines in fisheries, changes in river morphology and changes to downstream river deltas (Agostinho, Pelicice, & Gomes, 2008; Lehner et al., 2011; Fearnside, 2016). Alterations to a river's flow, which can include changes in speed, quantity, quality, and seasonal flooding patterns, are a major way that dams harm the environment (Lehner et al., 2011). Many terrestrial, riverine, and marine species rely on the way a river flows and floods to trigger their reproduction, dispersal, migration and feeding patterns (Lehner et al., 2011). When a dam and its reservoir alter the river, these species' processes are negatively impacted leading to their decline and extirpation from the local ecosystem (Lehner et al., 2011). One-third of the freshwater fish species on our planet reside among the Amazon, Congo, and Mekong river basins (Winemiller et al., 2016). Roughly 450 dams are planned or under construction just for these three river basins alone; if and when the dams are operationalized, these fish species will face decline and threats to their very existence (Winemiller et al., 2016). The environmental impacts of dams also adversely affect the human communities that rely on these ecosystems.

For example, fishers may lose access to certain fish species, while fish species abundance may decline (Castro-Diaz, et al., 2018; Bui, Schreinemachers, & Berger, 2013; Urban, Nordensvard, Siciliano, & Li, 2015). Farmers may lose access to river sediments which are necessary to replenish soil nutrients lost during crop harvest, and their land may therefore be at risk for erosion (Lehner et al., 2011). Communities that rely on other common pool resources

such as forests may lose the ability to hunt and gather forest products such as timber, firewood, fruit and honey (Ahsan & Ahmed, 2016; Nguyen et al., 2017; Siciliano et al., 2016; Yankson, Asiedu, Owusu, Urban & Siciliano, 2018). There are also social impacts to these human communities beyond just those stemming from the environmental damage caused by the dam's construction.

However, it can be difficult to predict, track, and measure dam induced social impacts. In their research, Kirchherr, Pohlner, and Charles (2016) argue that understanding these social impacts is complex due to the dimensions of time (the life of a dam may run over a century) and space (up and downstream communities may be affected along with resettled communities). The work of identifying the myriad, multifaceted ways individuals, households, and communities are affected by dam construction is often overlooked, downplayed, or ignored by dam authorities during the dam planning, construction and operational phases. In his research for the World Commission on Dams (WCD), Vanclay (1999) lists 61 negative social impacts that dam construction may cause including: reduced availability of food, decreased autonomy, worsened gender relations, increased inequity, diminished cultural integrity, and the loss of aspirations about the future. Namy (2007) organizes the most often cited adverse social impacts of dams into four categories. These include dispossession (losing assets and access to natural resources), cultural alienation (through loss of local ecological knowledge and connections to ancestral lands), health impacts (both physical and psychological), and discrimination (marginalized populations such as indigenous groups and low-income communities are disproportionally impacted).

Communities close to the dam may struggle to incorporate an influx of construction workers and other immigrants, leading to increased crime, sexually transmitted diseases and

alcoholism (Kedia, 2003; Cernea, 2004). Downstream communities are impacted as the fish species they rely on decline when seasonal flooding patterns and river flow are adversely affected by dam construction (Castro-Diaz et al., 2018). Though these examples highlight the ways downstream and upstream communities may experience losses due to a dam's construction (Richter et al., 2010), my research focuses specifically on the resettlement that occurs when communities are relocated when their homes and lands are destroyed to make way for the construction of a dam, or when they are submerged under a dam reservoir's waters.

2.2 Overview of dam induced resettlement

Depending on the size of the dam and reservoir, thousands of households may need to be resettled. In the largest resettlement case to date, 1.3 million were displaced by the Three Gorges Dam in China (Wilmsen, 2016). Resettled communities may struggle to retain their livelihoods as dam construction can vastly alter the landscapes both up and downstream of the dam.

The places where communities are resettled can impact resettlement outcomes. In the literature, I have identified five different types of resettlement sites. The first type of site is "intact" where one community is resettled intact in a new space where no other community had previously been living (though households may not be living exactly near the same neighbors as they were before). The second is "communities mixed together" where two or more pre-resettlement communities are resettled together in a new space where no other community had been living. The third is "resettled into a host community": one community is resettled into a community that already exists (the hosts). The fourth is "mixed and resettled into a host community" where two or more communities are resettled together into a host community.

Finally, the site type "scattered throughout multiple types of sites" occurs when one or more communities are broken up and scattered across site types during resettlement.

Though resettling a community by itself without a host community (the category "intact") minimizes the strain to families that can be caused by relocation among strangers (whether other resettled households or hosts), each of these ways of being resettled can led to problems. When a community is resettled within an already standing host community, the new families struggle to fit into the local economy and quickly fall behind or find themselves at a lower social status compared to the host community (Manatunge, Takesada, Miyata, & Herath, 2009; Souksavath & Nakayama, 2013). They can also feel isolated, have decreased mental health, experience discrimination, and face hostility and conflict from the host population (Xi, 2016; Heggelund, 2006). When multiple pre-resettlement communities are merged together post-resettlement in a new setting, conflict can arise as families struggle to orient themselves to their new homes and live among strangers (Manatunge et al., 2009; Souksavath & Nakayama, 2013). In the database of studies used for my analysis, only 17 cases explicitly identified the resettlement type of the relocated communities even though site type has a big impact on resettlers' outcomes. In the recommendations sub-section of this thesis, I call for more research on this topic.

Beyond the problems that can arise from the type of site a community is resettled within, individuals, households, and communities may face changes to access and use of natural resources, household structure, the ability to preserve cultural heritage, employment, social networks and community cohesion, gender roles and health risks (Égré & Senécal, 2003; Tilt et al., 2009; Bisht, 2009). In his study of the resettlement outcomes for 50 dams, Scudder (2005) found that lack of adequate financing, political will, and staffing capacity in resettlement programs along with a lack of employment opportunities and participation by communities in the

resettlement process led to decreases in standards of living for the resettled. Employment and other economic opportunities were inadequate for the resettled in 37 cases, the resettled were not able to compete with host communities in 14 cases, landlessness was a problem in 38 cases, food insecurity occurred in 33 cases, and dam authorities did not consider the importance of common property resources in 27 cases (Scudder, 2005).

2.3 Resettlement planning and post-resettlement support

The WCD created a framework in 2000 with 26 guidelines for dam development to improve the outcomes for resettled people around the world. A key recommendation advocates for providing entitlements to impacted people to help them improve their livelihoods while receiving a share of the dam construction benefits (WCD, 2000). The affected communities must also participate and be free to negotiate in the resettlement and compensation process (WCD, 2000). However, Tilt et al. (2009) found that these guidelines are often not followed, and negative outcomes for the resettled are often not planned for which decreases the chance for post-resettlement viability. These negative outcomes can include: changes to household structure (cause by out-migration), changes to employment, decreased access to natural resources, changes to social capital, and decreased health and wellbeing (Tilt et al., 2009).

Before a hydroelectric dam is constructed, a Social Impact Assessment (SIA) must be conducted by dam concessionaires[5]. These impact studies determine how many people will be resettled, what issues they will face post-displacement, and how much the process will cost (Égré & Senécal, 1990). To be effective, these assessments benefit from pressure from NGOs, project

[5] An Environmental Impact Assessment (EIA) should also be conducted to assess the potential damages to the river, the surrounding land, and the species that live among both (Nakayama, 1998), but as this thesis analyzes changes to human communities due to dam construction, I focus my discussion on SIAs.

impacted people, and international lending agencies (Égré & Senécal, 2003). However, often not enough time or data are provided for SIAs, and SIAs tend to focus on broad social issues instead of the specific ones that may be faced by those directly impacted by the dam (Égré & Senécal, 2003). SIAs may also underestimate decreases to livelihoods, may ignore losses to common pool resources, and may also not adequately consider socio-cultural impacts like the loss of local ecological knowledge and a historical connection to the land (Tilt et al., 2009; Vanclay, 1999). A common failing of many SIAs is that not all the stakeholders who will be negatively impacted by the dam are included in the planning process (Vanclay, 1999). Finally, when dams are built without any SIA conducted, the underestimation of resettlement costs becomes one of the main reasons so many resettlement programs fail (Égré &Senécal, 2003).

After an SIA is conducted, dam authorities (including financiers, builders, and the government) may implement a Resettled Action Plan (RAP). The RAP details the programs that are necessary to ensure a successful resettlement and helps to give voice to the resettled by keeping the government and other organizations on task throughout the process (Égré & Senécal, 1990). The RAP should include a compensation program (which may include cash and/or land) that is substantial enough to improve the livelihoods of the resettled, as recommended by the WCD (International Rivers, 2008). The RAP should also include plans for houses for the resettled and public infrastructure, along with employment opportunities and assistance programs to maintain livelihoods post-resettlement, although this is typically a difficult outcome to accomplish (Égré & Senécal, 2003). When the RAP works to predict social risks (preemptively planning for potential negative outcomes to the resettled) versus trying to address social impacts after they occur, the resettled are more likely to experience better outcomes (Cernea, 2004).

Case studies of resettlement provide evidence for which factors within the RAP and resettlement process lead to either positive or negative impacts to households and communities (Wilmsen, 2016; Tilt et al., 2009; Randell, 2016). According to the authors of a study on the Kotmale Dam in Sri Lanka, giving the resettlers a choice of where they would be resettled and what kind of land they would receive along with providing educational opportunities for their children, improved their livelihoods post-resettlement compared to their pre-resettlement lives (Takesada, Manatunge, & Herath, 2008). In contrast to these positive outcomes, at the Atatürk Dam in Turkey, negotiations during the resettlement process largely shut out communities from participating (Akça, Fujikura, & Sabbağ, 2013). Many of the resettled were therefore not able to retain their pre-resettlement employment, and income inequality increased between small and large landowners 20 years post-resettlement (Akça, et al., 2013). In their study on the planning process for Pakistan's Diamer Bhasha Dam, Sabir et al. (2017) found that a major reason for the delay of compensation and resettlement was due to a lack of adequate funding for the program. This led to major conflicts, some of which turned violent (Sabir et al., 2017). In their study of the Ralco Dam in Chile, González-Parra and Simon (2008) found that when a RAP does not plan for helping a community retain its former structure, social capital will decline, and communities will face family disintegration and social disarticulation. When local organization patterns and cultural activities are not preserved post-resettlement, social cohesion suffers; the authors advocate for RAPs to plan for "community re-articulation" post resettlement (González-Parra & Simon, 2008).

Finally, the RAP should be set up to provide long-term support for the resettled. As the resettlement process and post-resettlement recovery and adaptation phase often span years and even decades, there are multiple time periods where dam project authorities can implement

programs and policies that impact these processes. When long term support for the resettled is put in place by project authorities, outcomes for resettled communities are more positive compared to cases where support ends as soon as the dam is completed. There are several case studies that provide evidence of this. In a longitudinal study of the Three Gorges Dam in China, Wilmsen (2016) found that the RAP focused on economic investment in the region which led to the building of infrastructure such as schools and hospitals while encouraging industries to move to the area to provide jobs. Thanks to this long-term support, these resettled communities have experienced decreases in income inequality and increases in food security, wellbeing, income and employment thirteen years post resettlement (Wilmsen, 2016). Akça et al. (2013) found that through long-term resettlement planning, educational opportunities have increased post-resettlement for the Ataturk Dam resettled communities.

However, when this long-term support is not in place in the RAP (as is often the case), resettled communities are more likely to experience negative outcomes such as impoverishment and unemployment. For example, at the Bui Dam in Ghana, most of the new jobs created by the dam's construction went to immigrants flocking to the area instead of the resettled (Obour, Owusu, Agyeman, Ahenkan, & Madrird, 2016). Though the resettled were given cash compensation and monthly grants, this only lasted for one year which the resettled said was not enough to sustain them (Obour et al., 2016). The authors identified that had the resettled received training, agricultural extension services, and opportunities for other employment, they may have been better able to maintain or adapt their livelihoods to better fit their new resettlement location (Obour et al., 2016). At the Nam Theun 2 Hydropower Project in Laos, insufficient land resources were set aside for the agricultural needs of the resettled (Souksavath & Nakayama, 2013). Because the community converted from a nomadic lifestyle that practiced slash and burn

agriculture to an intensive agriculture lifestyle post-resettlement, the land will not be able to endure this intensity, and the livelihoods of the resettled will not be sustainable long term once the project concludes their support for these communities (Souksavath & Nakayama, 2013).

2.4 Livelihoods changes among the resettled

Livelihoods are more than employment or labor; they are a way of life providing materials beyond just income. Though a livelihood has several working definitions, I use one from Allison and Ellis's (2001) work on the livelihoods approach (which became the Sustainable Livelihoods Approach) that was built in part off Bebbington's (1999) Capitals and Capabilities Framework. In his framework, Bebbington (1999) characterized livelihoods based on five assets or capitals (produced, human, natural, social and cultural). These assets are not only the means by which people make a living, but they also provide meaning to their world. Therefore, they are not simply resources used to build livelihoods; assets give people the capability to act and to live (Bebbington, 1999). Allison and Ellis (2001) updated these assets to include natural, physical, human, financial and social capital but did not include cultural capital. Therefore, in this thesis, culture and cultural activities are included under the social category of livelihoods. The one aspect of a community's culture that is included within human capital instead of the social category of livelihoods are shrines venerating ancestors and sites for human remains such as tombs and graves.

As mentioned in the introduction, livelihoods are defined as "the assets..., the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household" (Allison & Ellis, 2001, p. 379). In this way, livelihoods are an integral piece of a community's culture and may be part of a family's means

of living for generations. Therefore, changing a livelihood is not as simple as finding a new job or even switching careers; livelihoods are often essential to a family and community's identity. In many cases, livelihoods such as farming, fishing, hunting, and gathering products from the forest are difficult to maintain post-resettlement. Being forced to change livelihoods can cause a deep sense of loss and unmooring. Studies of resettlement cases around the world portray changes in livelihoods; individuals that fished the river, farmed the land, and gathered forest products for generations have suddenly found themselves in a new setting far from the waters and land that once sustained them (Wilmsen & Van Hulten, 2017; Ahsan & Ahmed, 2016; Finley-Brook & Thomas, 2011; Siciliano et al., 2016; González-Parra & Simon, 2008; Polimeni, Iorgulescu, & Chandrasekara, 2014). The evidence from this thesis will portray the myriad ways that livelihoods are negatively impacted for the resettled as the assets, activities and access to both decrease post-resettlement.

2.5 Declining social capital among the resettled

I use the definition of social capital that Allison and Horemans (2006) developed in their work on the Sustainable Livelihoods Framework. Social capital comprises "the kinship networks, associations, membership organizations and peer-group networks that people can use in difficulties or turn to in order to gain advantage" (Allison & Horemans, 2006, p.758). Bebbington (1999) argues that people's livelihoods are dependent on social capital. The relationships among community members are often the essential means by which households can access resources, and this access itself is the most important resource in building sustainable livelihoods (Bebbington, 1999). Livelihood strategies in times of constraint (such as during resettlement) may involve a decision to overconsume one type of asset such as social capital. For

example, a household may benefit from social networks, but not contribute and attend to their maintenance (Bebbington, 1999). Thus, capitals are not just inputs to livelihoods but are also their outputs (Bebbington 1999).

Therefore, I argue that focusing on changes to social capital, just one of the five capitals or assets that are part of a household's livelihood, is critical to understanding outcomes post-resettlement. For the resettled, social capital may decline for myriad reasons. Cultural activities and rituals that were tied to the land lost to dam construction may vanish. Networks based on shared labor for farming or management of common pool resources may suffer as the resettled are forced to change their livelihoods. Families may lose connections to old neighbors and friends in their new communities when they are mixed with other resettlement groups, scattered among sites, or placed within a host community. As mentioned previously, resettling a community intact minimizes the strain to families that can be caused by relocation among strangers (whether other resettled households or hosts). When a community is resettled within an already standing host community or mixed with other resettled communities, the families struggle to fit into the local culture and economy, feel isolated, and experience increased rates of conflict (Manatunge, Takesada, Miyata, & Herath, 2009; Souksavath & Nakayama, 2013; Xi, 2016; Heggelund, 2006). This can all lead to decreased rates of social capital.

In this literature review section, I highlighted trends found across resettlement case studies that show the importance of conducting a SIA and implementing a RAP that provides long-term support for the resettled and includes training and assistance for the resettled to maintain, adapt, or change their livelihood strategies (Égré & Senécal, 2003; Wilmsen, 2016; Obour et al., 2016; Yankson et al., 2018). These cases also provide evidence of the importance of full community participation in the resettlement planning process which includes the accurate

dissemination of information, consultation, and the opportunity for negotiation with the dam project authorities (Akça et al., 2013; Obour et al., 2016; Siciliano et al., 2016) which all can contribute to improved post-resettlement outcomes including maintaining livelihoods and social capital. The results of the analysis of this thesis will provide further evidence for what exactly has changed for the resettled across dam sites along with how common, and often how detrimental, these changes to livelihoods and social capital are.

3. METHODS

3.1 Type of study

This thesis is a meta-analysis of resettlement cases due to large hydroelectric dam construction throughout the Global South published in peer reviewed journals from 1980 to 2019. The meta-analysis, essentially a study of studies, was first developed in the medical field in the 1970s (Rudel, 2008). Because researchers aggregated data from multiple studies, these studies' data had to have been collected on the same variables, with the same methods, and in similar settings for a meta-analysis to be properly conducted (Rudel, 2008). This is very unlikely in non-experimental studies as data needs to be collected in a uniform manner, and the analyses must be identical across studies. Instead, a model centered approach rather than a data centered approach can be utilized for these types of meta-analyses (Rudel, 2008). With my approach, I pool the methods that each researcher uses in their study detailing what people are experiencing post-resettlement. Each study (article) is a case or a collection of cases, while each report of how the resettled are faring becomes as observation in the dataset (Rudel, 2008). An analysis across these cases shows the common impacts to, and experiences of, the resettled. Since this is a meta-analysis of non-experimental cases, it requires standardized coding procedures that use measurable variable definitions to build a collection of data to compare information across cases (Cox, Villamayor-Tomas & Hartberg, 2014; Hruschka et al., 2004).

For our database, we are following the definition of cases and studies described by Cox et al. (2014). A study is a published journal article that describes one or more cases in depth. A single study may have more than one case. This could include research that describes resettlements at more than one dam, research that details the impacts of the same dam on different communities, or a longitudinal study that looks at the same resettlement community

over multiple time periods. We coded the study for as many times as the cases that were contained within the journal article. For example, Aiken and Leigh (2015) studied resettled communities at the Bakun Dam and the Batang Ai Dam. Therefore, this study had two cases and was coded twice, once focusing on the resettled community at Bakun and a second time focusing on the Batang Ai resettled community. In another example, Wilmsen and van Hulten (2017) conducted a longitudinal study of the resettled at the Three Gorges Dam. This paper was also coded twice; the first case was from research conducted on the resettled in 2004, while the second case was the same resettled group surveyed again in 2016.

Therefore, when I use the term "community" in context of the results of this thesis, I am referring to an individual resettlement case as defined above. Though the word "community" usually refers to a collection of households that were all resettled together because of the construction of one dam, in a few cases the word "community" is more nebulous. The authors of the studies covering the Lesotho Highlands Water Project and the Xe-Pian Xe-Namnoy Complex treated these dam complexes as single projects. They did not divide the study populations per dam but instead treated the population as a single unit impacted by the dam complex project as a whole; therefore the "communities" at these sites may be residing in multiple locations after resettlement. In other cases, it is possible that the study's authors do not differentiate between communities that were living together before but were separated post-resettlement and vice versa. We relied on how the authors described their sample population. If they did not differentiate their population in any way, then we treated it as one case. Therefore, the unit of analysis of this thesis is a case, which is typically one resettled community, as described above. Besides the Lesotho Highlands Water Project and the Xe-Pian Xe-Namnoy Complex, there is one dam per case.

3.2 Data collection

I, along with three students, built a database of case studies of large hydroelectric dams constructed throughout the Global South published in peer reviewed journals. To create this database, we started by conducting five searches in Google Scholar:

1. hydroelectric dam AND resettle*
2. hydroelectric dam AND compensation
3. hydroelectric dam AND displace*
4. hydroelectric dam AND migration
5. hydroelectric dam AND forced migration

We filtered the search for papers published from 1980 until January 2019. We focused on this period because the 1980s were the peak of World Bank funding for dam development. After this decade, protests at dam sites around the world forced the World Bank to start questioning its promotion of large dams (Goodland, 2010). We are interested in tracking dam construction cases from the height of World Bank funding and the start of major protests against dams until today when, once again, financing for large dams by the World Bank has been high for the past decade (Goodland, 2010). We included journal articles in our database only if the study was:

1. In English
2. About a hydroelectric dam case
3. Located in the Global South
4. Published in a peer reviewed academic journal

After deleting duplicates, we had a total of 400 papers from this search. I then read each abstract of these 400 papers and scanned the paper to ensure the study fit the following criteria:

1. Focused on resettlement and/or compensation due to a hydroelectric dam(s)[6]
2. The dam was large[7] according to the definition of the International Commission on Large Dams (ICOLD)

[6] I did not include a study in the final sample if the study only included a small section on resettlement with a focus on something else such as the decline of a fish species.

[7] ICOLD defines a large dam as: "A dam with a height of 15 meters or greater from lowest foundation to crest or a dam between 5 meters and 15 meters impounding more than 3 million cubic meters and defined in greater detail in the World Register of Dams" (2011, p. 3.).

3. Included at least one case study
4. Was not a viewpoint, editorial, or reviewed paper

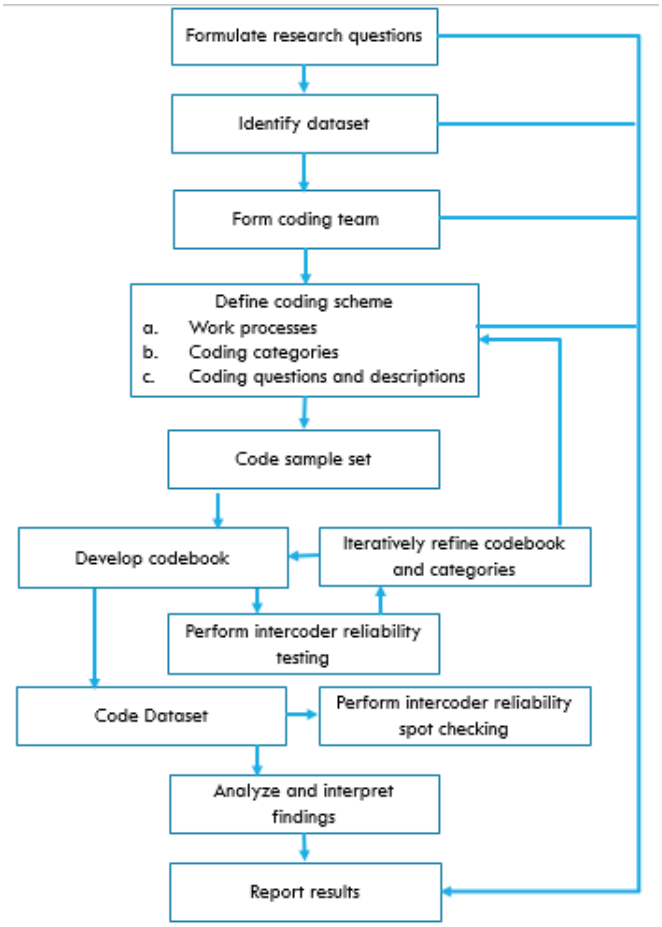
I deleted a paper from the database if it did not fit all four criteria. After this process, our final database had 113 papers. I then read through the bibliographies of many of these papers to find other resettlement studies that were not already included in the database. From this process, I added 33 studies to bring our total database to 146 papers. This shows that there were some limitations with Google Scholar as these 33 papers were not included in the original search. However, our database includes a wide variety of studies across years and countries which we feel covers a robust sample of resettlement cases in the Global South.

3.3 Study design

As we built the database, we were simultaneously creating a codebook. This codebook was crafted to approach and answer our research questions (some of which are outside the scope of my thesis). For this process, we adapted Ratajczyk et al.'s (2016) coding procedure. Our method was both emergent (we formalized and defined codes based on the resettlement and compensation procedures portrayed in the cases we read) and based on the literature such as Scudder (2005), Cernea (1996), and Allison and Horemans (2006). This process was not linear but instead looped back on itself as papers were coded, codes were refined, and the codebook finalized. The codes coalesced through a process of collaboration by the research team to determine the meaning of the codes and guidelines for using them. This process took from February to June 2018 as codes were combined, split, added, deleted and explicitly defined (see figure 2). Based on the coding procedures elucidated by MacQueen, McLellan, Kay, and Milstein (1998), we defined the code, decided how to measure the code, provided an example of the code from a case study, and detailed rules about when and how to use the code in a case.

Rudel (2008) points out that agreement among coders about which code to use declines when variables have categories that overlap. We therefore painstakingly edited code definitions to ensure that each code was uniquely characterizing a piece of information in the text.

Figure 2. Research process flow chart



Adapted from Ratajczyk et al., 2016

After the codebook was largely finalized in June 2018, we began performing intercoder reliability tests in NVivo, the software we used for coding. Intercoder reliability is determined by having at least two coders code a text and calculating a numerical index (the intercoder reliability index) of the level of agreement among the coders (Feng, 2014). We aimed to establish intercoder reliability in order "to reduce the error and bias generated when individuals (perhaps unconsciously) take shortcuts when processing the voluminous amount of text-based data

generated by qualitative inquiry" (Hruschka et al., 2004, p. 309). We used Cohen's kappa coefficient (***K***) to measure our intercoder reliability because it takes into consideration the possibility of chance agreement between coders (Feng, 2014; Hruschka et al., 2004). The kappa coefficient ranges in measurement from 0 (no agreement between coders other than by chance) and 1 (perfect agreement between coders) (Hruschka et al., 2004).

We worked to achieve a Cohen's kappa coefficient of above 0.4 among the four coders for ten cases. This metric was based on Landis and Koch (1977) who listed a score of 0.41 to 0.6 as moderate agreement between two coders.[8] With a codebook as large as the one we use for our research, and because we had four coders instead of two, we determined that a score of 0.4 and above shows good agreement. Typically, when a meta-analysis is conducted, coders use a much smaller codebook than the one we built (which has 117 codes); therefore, our intercoder reliability scores show that our team was able to utilize a large codebook with myriad information and still have agreement among coders. Our intercoder reliability process took from September 2018 to February 2019. Each time any of our scores were under 0.4, we carefully went through the paper together to understand if we were interpreting the codebook's codes and rules differently. We continued refining and clarifying the codes' rules and definitions. We would then re-code papers and code new papers to improve our intercoder reliability.

In January of 2019, our codebook was finalized with 117 codes (see a modified version of this codebook in Appendix B). These codes were organized into themes in an emergent process. As we created our codebook, we began to see patterns in our codes and grouped them accordingly into themes of similar types of codes. For example, fifteen codes focused on the dam details which included codes such as cost, size, location, and investors. Twelve codes provide

[8] Scores of 0.61 to 0.8 are considered substantial agreement among coders whiles scores of 0.81 to 1 indicate almost perfect agreement (Landis & Koch, 1977).

information about the study itself such as the number of participants and whether it was longitudinal. Eighteen codes focused on compensation such as if there was a delay in when compensation was provided, who in a household received it, and what type of compensation was given. Fifteen codes provide information on whether and how the people impacted by a dam were able to participate in the resettlement and compensation process (with codes such as information transparency and the ability to negotiate compensation). Forty-one codes focused on what changed post-resettlement which includes codes about social capital and livelihoods, among others. Finally, the remaining 16 codes cover recommendations the study authors made, economic changes to the region, information about the RAP, whether opportunities varied depending on demographics, evidence of coping and adaptation, and the presence of conflict and activism.

After the four researchers coded 10 cases with intercoder reliability scores all above 0.4 (the range for these scores was from 0.4 to 0.74), we began coding cases individually in February of 2019. We divided the database among the four coders. We created a randomly generated number for each paper in Excel and then sorted each row in descending order based on these numbers. Each researcher got a portion of this list to code individually. For my thesis I coded 40 papers, and the rest of the coding team coded 36 studies by March of 2019 (which included recoding the ten papers that were originally coded during the intercoder reliability testing phase as we added a few new codes to the codebook). As suggested by Ratajczyk et al. (2016), after we coded individually, we performed intercoder reliability spot checking to ensure we continued to have intercoder agreement. Each researcher coded three papers, one from each of the other three coders. We achieved intercoder reliability scores all above 0.4 for these 12 coded papers. For the sample of papers I used for my thesis, seven studies were dropped as they covered communities

impacted by and sometimes compensated due to dam construction but that were not resettled (these communities were both upstream and downstream of the dam). As I needed to start my analysis for this thesis by the spring of 2019, not all the 146 studies in our database could be coded by this time. Since I wanted to have at least 100 cases for my research, we were able to finish the coding process with 69 papers because these constituted 101 cases (see Appendix A).

3.4 Data analysis

It is important to note that even if a case does not mention whether one of the variables that we have in our codebook occurred (such as conflict, relocation choice, or a change in access to fisheries), this does not mean that the resettled did not experience it. Instead, we can only infer that the researchers did not report on those variables. Researchers are limited in their scope of what they can study at a dam site for myriad reasons: their research interests, the research question they are investigating, the methods they use to collect data and analyze it, the time they are in the field, how much access they have to the resettled, and the expertise of the researcher, to mention just a few of the ways a study's focus cannot encompass all the changes that occur post-resettlement. In many cases, the study authors noted that their focus was on a specific aspect or aspects of resettlement.

In fact, the articles in this database cover dozens of research topics including: changes to mental and physical health, environmental destruction, disruptions to fishers and farmers, impacts to women, degradation of culture and community identity, the presence of conflict and activism, increases in ecotourism, energy justice, changes to wealth and well-being, the role of governance in dam construction, and dam construction as a tool for development. Methods for data collection include surveys and questionnaires, informal group discussions and focus groups,

in-depth semi-structured and structured interviews, sight visits and observation, and document review. The study population of the cases in the database included both resettled people and personnel in important positions such as such as dam authorities, government workers, and members of NGOs. Study sample size ranged from a low of 13 resettled families at the Foz do Chapecó Dam to a high of 5107 people surveyed before being resettled at the Nam Theun 2 Dam (Rosa, Busata, Ferraz, & Camponogara, 2018; Erlanger et al.,2008). Several cases compared resettled communities with non-resettled communities nearby to control for resettlement outcomes, though this was not the norm among studies. Finally, there were at least 17 difference frameworks utilized by study authors such as the Sustainable Livelihoods Framework, the Energy Justice Framework, and Political Ecology.

This variety of research topics, methods, and frameworks explains why the study's focus may not leave room for each way a household or community is impacted post-resettlement. For example, though social capital declined in only 23 cases in this database, this does not mean that it was not also impacted in the other 78 cases. The authors of these other 78 cases may not have had the expertise, time, or space to report on changes to social capital. The database is limited by what the study authors reported; therefore, I use caution by not drawing broad conclusions about which codes are not reported when. I only reported that something occurred (and coded for it), when the study explicitly mentioned that it happened. When I only could infer from some of the descriptions in the case that the change or event may have occurred, I did not code the event since I did not have the text to report the claim.

Of the 117 codes in our codebook, I focus on the 34 codes that describe changes to livelihoods which include the codes relevant for the definition of social capital I am using in this thesis. Though most of these codes are measured by increase, decreased or stayed the same,

some codes are dichotomous and measured by yes or no (whether they occurred or not). One of these 34 codes is called *post-livelihoods* which includes changes to assets, access, and activities. However, we do not use the code *post-livelihoods* if we have a livelihoods code that provides more specific information. For example, if the case notes that the resettled lost access to the river where they used to fish, we code this as decreased fisheries access, but we do not code this under *post-livelihoods.* Therefore, from the code book, we have a collection of codes to be used for specific ways livelihoods change and an overall code for livelihoods changes that is used when a more precise code does not fit. Table 1 lists each of these codes, their definitions, and how they are measured. For my analysis, I pooled together certain codes to gain a more comprehensive understanding of how the resettled's livelihoods changed. This will be explained more fully in the discussion section.

Table 1. Livelihoods codes used for analysis

Variable	Definition	Measurement
Natural Capital	How natural capital has changed which can include fish stocks, land, crops cultivated, etc. post resettlement.	increased/decreased/ stayed the same
Post fish quantity	How fish quantity/levels changed post resettlement	increased/decreased/ stayed the same
Post natural products quantity	How forest products changed post resettlement. Not coded when authors are referring to fisheries.	increased/decreased/ stayed the same
Post water quality	How water quality has change post resettlement.	increased/decreased/ stayed the same
Post soil	How soil quality changed post resettlement.	increased/decreased/ stayed the same
Post crop yield	How crop yield changed post resettlement.	increased/decreased/ stayed the same
Post livestock amount	Whether the amount of livestock that people own changed post resettlement.	increased/decreased/ stayed the same
Post crops	If crop species grown changed post resettlement.	yes/no
Post livestock	If livestock species that people own changed post resettlement.	yes/no
Post livelihoods	If livelihoods changed post-resettlement (assets, access, activities). Only used when there is not a more specific livelihoods code that fits better.	yes/no
Post fisheries access	How access (distance, physical barriers, loss of equipment, etc.) to fisheries changed post resettlement.	increased/decreased/ stayed the same
Post natural areas and natural products access	How access (distance, physical barriers, loss of equipment, etc.) to natural areas and natural products changed post resettlement.	increased/decreased/ stayed the same

Table 1. (cont'd)

Post food access	If access to food changed (for example if t used to plant their food but now must buy food from a store, etc.) post resettlement.	yes/no
Post food security	How food security changed post resettlement.	increased/decreased/ stayed the same
Physical capital	If authors say physical capital has changed such as agricultural and business equipment, houses, consumer durables, vehicles and transportation, water supply and sanitation facilities, and communications infrastructure.	increased/decreased/ stayed the same
Community compensation	Compensation given to the community and/or municipality by the dam builders.	roads/schools/health centers/energy/other
Post health access	Whether the access to health services changed post resettlement.	increased/decreased/ stayed the same
Electricity access after resettlement	If resettled have access to electricity post resettlement.	yes/no
Post water access	If access (distance, physical barriers, loss of equipment etc.) to water changed post resettlement.	increased/decreased/ stayed the same
Human Capital	If authors say human capital has changed including people's capabilities in terms of their health, labor, education, knowledge, and skills.	increased/decreased/ stayed the same
Post health	How overall health status changed post resettlement. Includes mental health.	increased/decreased/ stayed the same
Post status assets	If social status (the importance of a person in relation to other people within the community) based on assets changed post resettlement.	yes/no
Post status prestige	If social status based on prestige (person's reputation) changed post resettlement.	yes/no
Post employment	Whether access to employment changed post resettlement.	increased/decreased/ stayed the same
Information transparency	Whether the authors mention that information shared to affected communities was incomplete/altered.	yes/no
Post school	Whether the access to schools that people had changed post resettlement.	increased/decreased/ stayed the same
Financial capital	If authors say financial capital has changed such as savings, credit, and inflows.	increased/decreased/ stayed the same
Post income	Whether income changed post resettlement (can include words like changes in economic/financial security).	increased/decreased/ stayed the same
Post income inequality change	Whether income inequality changed post resettlement.	increased/decreased/ stayed the same
Social capital	How social capital has changed such as membership in organizations/groups and social/professional networks.	increased/decreased/ stayed the same
Post community trust	How trust among community members changed post resettlement.	increased/decreased/ stayed the same
Post family and friend connections	Whether connections among kin and friends changed post resettlement.	increased/decreased/ stayed the same
Post cultural activities	Whether cultural and community activities changed post resettlement	increased/decreased/ stayed the same
New site neighbors	If resettled were able to continue living close to old neighbors	Yes/no

4. DISCUSSION

4.1 Overview of cases

My sample for this thesis is 69 studies, which includes 101 cases. As defined earlier, a study is a published journal article that describes one or more cases in depth. A single study may have more than one case, and we coded the study for as many times as cases it had. Tables 2 and 3 list the demographics of the sample including dam names, locations, and how many cases there were per dam. Most of the dams (27) and cases (60) are in Asia, thanks in part to China, which has 29 cases and 11 dams. Among these, the Three Gorges Dam is the focus of 12 cases. The second most common country among the cases is Brazil (13 cases and five dams) with Belo Monte Dam in seven cases, followed by Ghana (12 cases and three dams) with the Bui Dam in 10 cases. My dataset therefore is representative of the distribution of the actual large dams in the Global South of which Asia has the highest number of dams, followed by Africa and Latin America, though this may change based on the number of planned dams in Brazil (Global Dam Watch, 2019). For river basins within my dataset, 11 cases are in the Amazon Basin, 14 are in the Volta, 14 cases are in the Yangtze, and 24 cases are in the Mekong Basin. Though the Kamchay Dam in Cambodia featured prominently in our database, its cases could not be used for this thesis as none of the impacted communities were resettled.

Table 2. Dataset dam distribution by country

Global Region	Country	Number of dams	Number of cases
Africa	Ethiopia	2	3
	Ghana	3	12
	Zambia	1	1
	Burkina Faso	1	1
	Sudan	1	1
	Nigeria	2	2
	Lesotho	1	1
	Togo	1	1
Asia	Malaysia	2	7
	Tukey	2	4
	China	11	29
	Laos	3	5
	India	4	7
	Vietnam	4	5
	Indonesia	1	3
Latin America	Brazil	5	13
	Colombia	1	1
	Panama	2	2
	Chile	1	1
	Guatemala	1	1
	Honduras	1	1
Total:	**21**	**50**	**101**

Table 3. Dam in dataset and distribution among cases

Dam	Location	Cases
A Luoi Dam	Vietnam	1
A Vuong Dam	Vietnam	1
Atatürk Dam	Turkey	2
Bagré Dam	Burkina Faso	1
Bakun Dam	Malaysia	6
Bapanxia Dam	China	2
Batang Ai Dam	Malaysia	1
Belo Monte Dam	Brazil	7
Binh Dien Dam	Vietnam	1
Bonyic Dam	Panama	1
Bui Dam	Ghana	10
Chan 75 Hydroelectric Project	Panama	1
Chixoy Dam	Guatemala	1
Dachaoshan Dam	China	1
El Cajón Dam	Honduras	1

Table 3. (cont'd)

Foz de Chapecó Hydroelectric Plant	Brazil	2
Gangkouwan Reservoir Project	China	2
Gibe III Dam	Ethiopia	2
Gilgel Gibe-I Dam	Ethiopia	1
Hirakud Dam	India	1
Ilisu Dam	Turkey	2
Kainji Dam	Nigeria	1
Kariba Dam	Zambia	1
Kpong Dam	Ghana	1
Lesotho Highlands Water Project[9]	Lesotho	1
Liujiaxia Hydrostations	China	2
Machadinho Hydroelectric Power Plant	Brazil	1
Manwan Dam	China	2
Merowe Dam	Sudan	1
Nam Theun 2 Dam	Laos	3
Nangbeto Dam	Togo	1
Nuozhadu Dam	China	2
Ralco Hydroelectric Plant	Chile	1
Saguling Dam	Indonesia	2
Sanmenxia Dam	China	2
Sardar Sarovar Dam	India	1
Son La Dam	Vietnam	2
Teesta Low Dam III	India	1
Tehri Dam	India	4
Theun-Hinboun Hydropower Project	Laos	1
Three Gorges Dam	China	12
Tijuco Alto Dam	Brazil	1
Tucuruí Dam	Brazil	2
Urra Dam	Colombia	1
Volta (Akosombo) Dam	Ghana	1
Xe-Pian Xe-Namnoy Complex[10]	Laos	1
Xiaowan Dam	China	1
Xin'anjiang Hydropower Station	China	1
Yanguoxia Dam	China	2
Zamfara Dam	Nigeria	1
Total: 50	**21**	**101**

Across these cases, there was a large range between the year(s) the dam was constructed and became operational and the time the study authors collected their data. I do not have a full set of data on these timeframes because some authors did not report when their data was

[9] This is a complex of different of dams. However, Mwangi (2007) treated this dam complex as a single project, not as individual dam. The same applies to the way he treated the population impacted by the dam. He did not divide his study population per dam, but instead treated this population as a single unit impacted by the complex of dams.
[10] This is also a dam complex spanning several dams, but Green and Baird (2016) treated this dam complex, and the population affected by it, as one unit (see footnote 9).

collected, while in other cases, dams were under construction for years or even decades, but the authors did not report what year their study sample was actually resettled. From the data I do have, the span between dam construction (used as a proxy for the resettlement year) and the study time was an average of 11 years. The longest spans of time were for the studies on the Kariba Dam in Zambia and the Hirakud Dam in India, both of which were constructed in the 1950s while the research data were collected in 2004 and 2008, respectively (Crooks, Cliggett, & Gillett-Netting, 2008; Nayak, 2010). In contrast, the shortest timeframes were for less than a year. However, most studies were conducted either soon after the dam's construction was completed or during the construction phase.

This relatively short time span average belies the fact that in the near or distant future, the resettled's outcomes may vastly change for better or for worse. Of the seven longitudinal cases in my database, only one of which reported on more than one generation post-resettlement (Crooks et al., 2008), outcomes were mixed for the resettled. How the resettled's livelihoods are impacted at just a few years post-resettlement, may greatly change in the coming years. Scudder's (2005) Four Stage Framework, which is a predictive theory for successful resettlement cases (where standard of living increases compared to pre-resettlement levels), takes two generations; therefore, the shorter average time span of the cases in this dataset may not provide us with the entire picture for how resettled communities fare long term.

4.2 Overview of changes to livelihoods

Across these studies, livelihoods changed, mostly in negative ways, for the resettled in the vast majority cases. The resettled faced challenges to maintaining their way of life after dam construction as assets decreased, access to resources declined, and livelihoods activities

deteriorated. Though in some cases capital assets increased (mainly physical capital), the resettled typically lost assets and access to the means of continuing their livelihoods including fisheries, the forest, and land to grow crops. In the codebook, 34 codes tracked the myriad ways the resettled's livelihoods could change (see Table 1). Figure 3 lists these codes, whether these means of maintaining a livelihood increased or decreased, and the degree this was so. When both a positive and negative sign are listed after the code, there was a difference of less than five cases between an increase to that livelihood activity and a decrease. For example, there were 11 cases where health access increased and eight cases where it decreased for the resettled so both a plus and minus sign are listed after "health access."

The codes listed in Figure 3 are divided among assets, activities and access. These are grouped within physical, natural, social, financial, and human categories. Each of these five categories encompass several codes, and within each category is the corresponding capital code that describes changes to assets. For example, the human capital code within the human category denotes only when there is a change to a human asset for the resettled. Therefore, human capital is just one subset of assets within the entire human category which includes assets, activities and access. Sixteen cases showed declines in human capital alone while there were declines or negative changes to the human category of livelihoods (which includes the codes for human capital, social status, health, employment, information transparency, and access to schools) in 52 cases. The distinction between capital and category is important throughout this discussion, and the five capital codes will be described more fully in this section.

Finally, each item in Figure 3 is one code in our codebook except for the entries, "roads", "schools", "health centers" and "other" (this will be discussed more fully later in this thesis) which were all sub-codes that we coded within the *compensation community* code. The entry,

"water access," which is derived from the code *post-water access*, is listed within both the physical and natural category of livelihoods. Finally, the code *post-livelihoods* is included in this figure under "livelihoods code" as was defined and discussed in the data analysis sub-section and is included in both the natural and human category. The results of this figure will be more fully explored throughout this discussion section.

Figure 3. Degree of changes to livelihoods among the resettled

CHANGES TO LIVELIHOODS

	ASSETS	ACTIVITIES	ACCESS
Natural	Natural Capital - Soil quality - Crop yield - Fish quantity - Water quality – Livestock amount – Natural products quantity –	*Crop type – *Livelihoods code – Livestock type (no observations)	Fisheries access – Natural Products access – Water access + – *Food access – Food security –
Physical	Physical Capital + – Roads + Schools + Heath Centers + Other +		Health access + – Electricity access + Water access + –
Human	Human Capital – Health – *Social status: assets – *Social status: reputation –	Employment – *Livelihoods code –	*Information transparency – Education access +
Financial	Financial Capital – Income – Income inequality + –		
Social	Social Capital – Community trust –	Cultural activities – Family & friend connections –	*New site neighbors –

+ less than 10 cases with a positive change
- less than 10 cases with a negative change
+ more than 10 cases with a positive change
- more than 10 cases with a negative change
* codes measured as yes/no, but observations were predominantly negative throughout cases

Figure 4 lists each of the livelihoods codes and shows how often they appeared among the cases. The left side of the graph denotes a negative change or decrease for the resettled for

the code while the right side shows how many cases had a positive change or increase for the code. These codes are divided among the five livelihoods categories by color. Note that for many codes, both positive and negative changes were reported.

Figure 4. Impacts to Livelihoods Post Resettlement

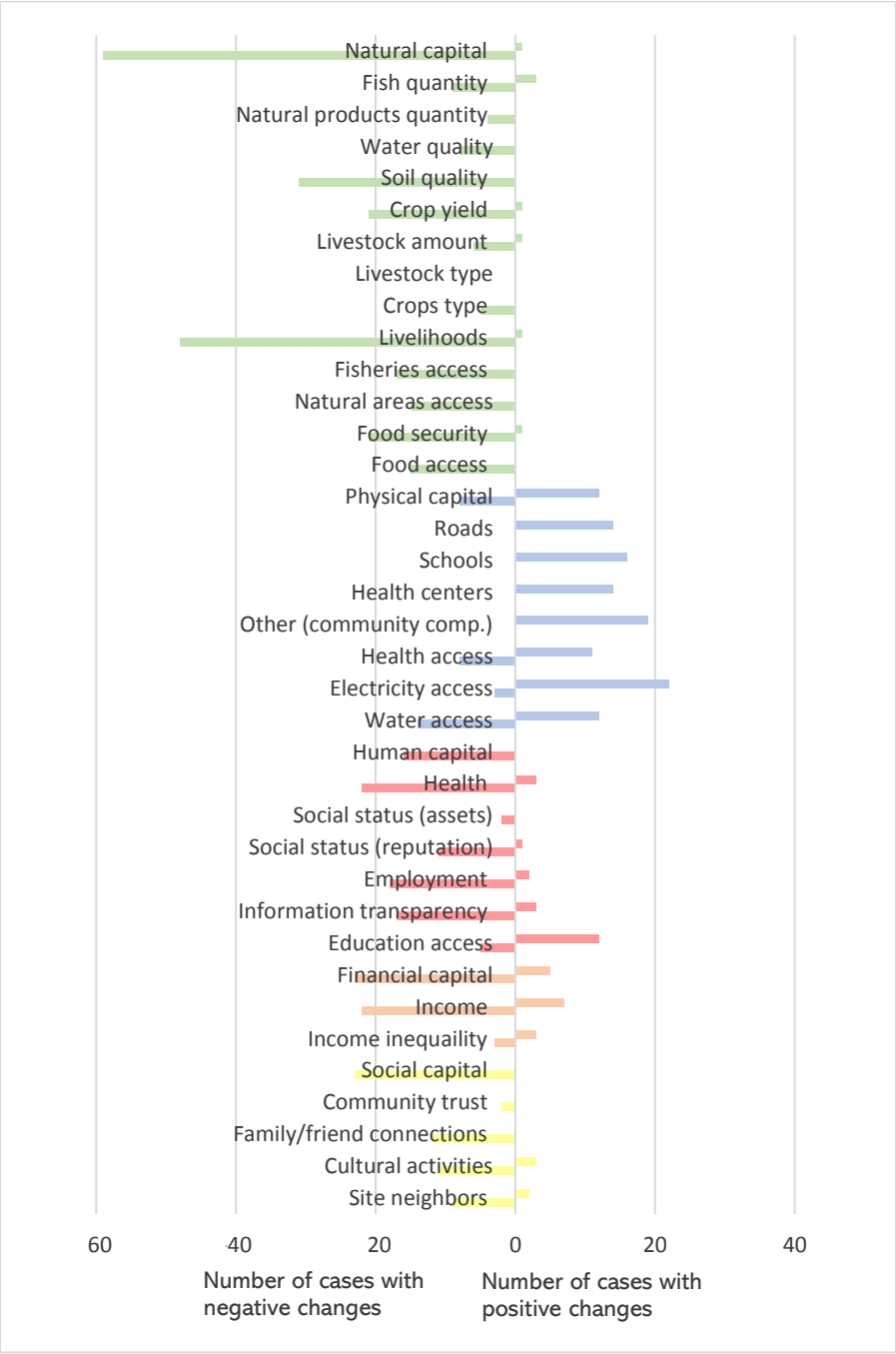
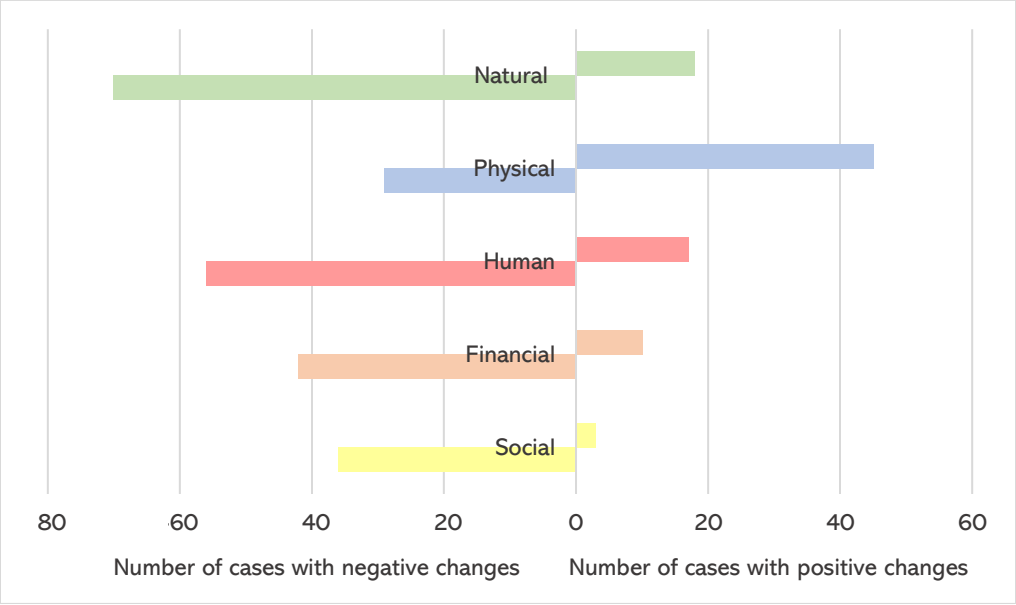


Figure 5, an aggregation of Figure 4, provides an overview of the number of cases that had at least one code where the resettled experienced a change within one of the livelihoods categories. Because the unit of analysis for my thesis is cases (as defined in the methods section), if a case included as least one instance of a change to a livelihood category, it is included within Figure 5. For example, one case may list decreases to fisheries access as the only instance of a negative change to the natural category of livelihoods. Another case may describe decreases to crop yield, soil quality, and food security as all examples of negative impacts to the natural category. However, both cases are counted as once within Figure 5 as cases with negative changes in the natural category of livelihoods. A case could be counted both on the left side of the graph (showing negative changes) and the right side (showing positive changes) if the case included instances of both changes. For example, a case may explain that the resettled had decreased access to natural products but experienced an increase to the quantity of fish that they caught. Therefore, this case would be included on both the left side and the right side of Figure 5. This figure highlights just how common negative changes are for the resettled.

Figure 5. Changes within the Livelihoods Categories



There were decreases to at least one of the five capitals codes in 69 cases, showing that a reduction in livelihoods assets was a major commonality among the cases. This is especially startling since each of these capital codes were *only* used when we did not have a more specific code to note the ways livelihoods changed. For example, though a decline in soil quality or a reduction in the amount of fish a family caught are decreases in natural capital, these would be only coded under *post-soil: decrease* and *post-fish quantity: decrease*. They would not be coded under *capital natural: decrease*. Each code listed in the "assets" column in Figure 3 is part of the capital it is grouped with. For example, health and social status are types of human capital, but we had separate codes denoting each in order to cull more detail from our cases and organize what was happening to the resettled across cases in a more systematic way. When all the codes noting a negative change are combined from Figure 3, the resettled experienced a reduction or disruption to their livelihoods in 90 cases.

4.3 Changes to livelihoods: natural capital and activities

Among all the types of assets, natural capital was the most common capital the resettled lost. In fact, this was the most used code of any from the codebook in our database. The most common way natural capital decreased was through the loss of land quantity which occurred in 53 cases. This typically took the form of decreases to land to grow crops or raise livestock. When compensated, the resettled were often given less land than they had before and/or lost common property such as forests for hunting and gathering food, fibers, and fuel or grazing areas for livestock (Aiken & Leigh, 2015; Beck, Claassen, & Hundt, 2012; Faure, 2003). With less available land, which was often of worse quality, many resettled families faced declines in crop yield (21 cases) and the amount of livestock they could care for (6 cases). For example, the Son

La Dam resettled lost crop output which lead to both lower income and a decrease in dietary diversity (Bui et al., 2013). In cases when the resettled were able to retain the same amount of land, soil quality often decreased, which occurred in 31 cases. Loss of land lead to many other problems including marginalization, loss of income, decreased food security, and environmental degradation when land is overused (Heggelund, 2006; Huang, Lin, & Li, 2018; Ty, Van Westen and Zoomers, 2013; Mwangi, 2007).

Regarding access to types of natural capital, resettled lost access to fisheries in 17 cases and the forest or other natural areas in 15 cases while access to water improved in some cases and declined in others. Losing access to forests and fisheries had a similar cascading effect as the impact of losing land. For example, decreased access to forests and fisheries led to reduced income, decreased food self-sufficiency, and degradation of culture (Hausermann, 2018; Choy, 2004; Siciliano, Urban, Tan-Mullins, & Mohan, 2018). In some cases, this contrasted with what was promised to the resettled by dam authorities. For example, the Bui Dam resettled were promised benefits from fishing the newly created reservoir, but the necessary training required to learn how to fish this new resource never materialized (Yankson et al., 2018). The resettled were also not giving the needed fishing gear to fish in the lake; therefore, their livelihoods suffered as they lost access to the fisheries that once supported them (Yankson et al., 2018).

Obour et al. (2016) found that the collapse of the fishing industry post-resettlement caused changes to cultural practices; for example, a communal fishing festival where fish were shared with families both in and outside of the community was no longer celebrated. Choy (2004) noted that the Bakun Dam resettled indigenous community experienced restricted movement due to forest loss which led to an "erosion of their socio-cultural identity and to a deprivation of their sources of psychological and spiritual satisfaction" (p. 63). This sentiment

was echoed in other cases. Loss of land and access to natural spaces causes problems beyond those related to land, fisheries, income and food; it can lead to a loss of community identity and culture (Abrampah, 2017; Hernández-Ruz, Silva, & do Nascimento, 2018).

When changes in livelihoods occur, livelihood activities themselves changed. *Post-livelihoods* was the second most frequently used code after *capital natural*. As mentioned previously, this code, like the capital codes, was only utilized if there was not a more specific code to use. Therefore, *post-livelihoods* noted broader changes to livelihoods. Though, almost all these changes were couched within the natural category of livelihoods, some changes occurred within the human category. Therefore, I included this code in both sub-sections. These changes under the *post-livelihoods* code can be grouped into three categories, the first two of which are discussed here while the third is detailed in the human category sub-section of this discussion. The first occurs when the resettled changed their livelihood activity, such as from farming to fishing, or when they entirely abandoned the way they made a living (Hernandez-Ruz et al., 2018; Heggelund, 2016; Asiama, Lengoiboni, & van den Molen, 2017). In almost every instance, this was not by choice; the resettled were forced to do so due to loss of access to land or fisheries as discussed previously. Secondly, the livelihoods code was used for changes in scope of livelihoods activities, such as when a farmer went from growing crops on a large swath of land to a small plot, and for changes in degree, like if a fisher went from fishing in the river to fishing in the newly created reservoir.

There were a few cases that reported positive livelihoods changes under this code. Randell (2017) found that some of the Belo Monte resettled were able to use their compensation money to switch to more lucrative income generation strategies such as cacao farming and raising cattle. The Nam Theun 2 Dam resettled reported satisfaction with their resettlement lives

and the new access to schools and infrastructure now that they converted from a largely nomadic lifestyle to an agrarian one (Souksavath & Nakayama, 2013). However, RAP support ended 2014, a year after the study was published, and there was already evidence that the intensive agriculture practiced by the resettled was quickly depleting the land (Souksavath & Nakayama, 2013). However in most cases, these instances of changes to livelihoods noted in the *post-livelihoods* code are framed in the negative with terms such as disruption, suffering, loss, impoverishment, scarcity, difficulty, and unhappiness used to describe the impacts of the communities and households forced to give up a large part of what brought them meaning. Aiken and Leigh (2015) report that the resettled communities at the Bakun Dam were "traumatized by resettlement and widely forced into cash-based economies for which they were ill prepared" and "suffered from frayed social relationships, high rates of unemployment and enduring poverty" (p. 85). At the Bui Dam, resettled communities "spoke of depression and anxiety resulting from resettlement processes and livelihood changes" and their "psychological well-being suffered tremendously" (Hausermann, 2018, p. 642 and 643). These cases highlight how changes to livelihoods can lead to mental anguish and social tension; families who may have practiced the same livelihood for generations are destabilized when forced to abandon their way of life post-resettlement.

4.4 Changes to livelihoods: physical capital and access to physical assets

Though the resettled's livelihoods most often changed within the natural category, there were also changes within the physical category. In fact, of the five livelihoods categories, the resettled were only able to achieve more increases than decreases in physical capital and access to physical assets. This usually took place through community compensation by dam

concessionaires. This differed from other forms of compensation as it was provided for the resettled group as a whole instead of given to individual households separately. This type of compensation was meant to be used communally and could also benefit others when the resettled were placed within host communities. I found this type of compensation across dam cases in the countries of Malaysia, Vietnam, Laos, India, Ghana, Ethiopia, Zambia, Brazil and Chile. (Choy, 2004; Ty et al., 2013; Virtanen, 2006; Wood, 1993; Hausermann, 2018; Legese, Van Assche, Stelmacher, Tekleworld, & Kelboro, 2018; Crooks et al., 2008; Leturcq, 2016; González-Parra & Simon, 2008). Our *compensation community* code has five categories: *roads*, *schools*, *health centers*, *access to energy*, and *other*. Community compensation was mentioned in 26 cases, and the most common measure was the provision of schools and access to health facilities.

It was often difficult to tell whether community compensation replaced a community asset that was lost to the dam or if the compensation provided new infrastructure for the resettled such as when energy and roads were provided to the resettled in an area that previously lack both (Obour et al., 2016). Depending on the case, resettled communities were sometimes able to negotiate this type of compensation. In other cases, the dam authorities decided what the community would receive, which was sometimes not enough or even useful. For example, at Three Gorges Dam, the hospitals and schools provided by the government did not fully meet the needs of the resettled, while at the Bakun Dam, resettlers complained that they had no access to transportation to make use of the new roads (Wang, Wolf, Lassoie, & Dong, 2013; Choy, 2004). In other cases, the quality of the infrastructure was mediocre; the Bui Dam resettled pointed out that the sanitation facilities provided by community compensation measures quickly broke and were unusable (Urban et al., 2015).

However, in many cases, this was the biggest positive aspect to relocation mentioned by

the resettled (Siciliano et al., 2018; Souksavath & Nakayama, 2013). Most of the Nam Theun 2 Dam resettled reported that the resettlement site was "good for their children" because of the improvements provided by community compensation such as schools, health services, and clean water (Souksavath & Nakayama, 2013, p. 85). According to interviews conducted with the Bakun Dam resettled, a big improvement at their new location was the local clinic. It is now much safer for women to give birth because they are attended by medical professionals; pre-resettlement, women gave birth at home or spent hours on a boat to get to a clinic (Siciliano et al., 2018).

The category *other* under *compensation community* included myriads forms of compensation such as storehouses for food and seeds, help in patrolling reserve boundaries, vehicles, community centers, libraries, cultural buildings, museums, infrastructure for telephones, irrigation schemes and boreholes, communal lands and ponds, and parks. Due in part to this form of compensation, in addition to in-home access to water and electricity, the resettled were often able to experience increases to physical capital across many cases. This is not to say that the resettled did not lose physical capital. In some cases, households were compensated with worse quality houses compared to what they lived in pre-resettlement (Johnston 2010; Mills-Tettey, 1989). In other cases, the resettled lost fishing and farming equipment to either the initial reservoir filling or during both planned and unplanned floods caused by dam reservoir releases (Owusu, Obour, & Nkansah, 2017; Wilmsen, Adjartey, & van Hulten, 2018; Faure, 2013).

4.5 Changes to livelihoods: human capital and activities

In terms of the human category of livelihoods, the only increase reported in the studies occurred through improved access to schools and education thanks to community compensation

measures. However, the resettled faced decreases to the human category in social status (11 cases), human capital in general (16 cases), employment (18 cases), information transparency (17 cases), and physical and mental health (22 cases). Our *capital human* code measured changes to people's capabilities in terms of their health, labor, education, knowledge and skills (Allison & Horemans, 2006). Like social capital, human capital can be difficult to quantify and track. Instances of decreases of this form of capital among the resettled included communication problems within host communities, loss of temples, loss of ancestral burial grounds and tombs, loss of knowledge and skills from migration out of the resettlement site, and a distortion of social memory (Xi, 2016; Kedia, 2003; Jing, 1999; Green & Baird, 2016; Sovacool & Bulan, 2011; Abrampah, 2017). As mentioned in the literature review, the one aspect of a community's culture that is included in this human category (within human capital) instead of the social category of livelihoods is tombs, burial grounds, and shrines venerating ancestors.

Loss of burial grounds and tombs was a common way the resettled experienced decreases to human capital. This loss was framed in the form of an erosion of knowledge; as the resettled lost connections to physical graves, their remembrance of ancestors and understanding of their past diminished. For example, at the Bui Dam, the resettled lost ties to their former landscape which included shrines venerating the dead and cemeteries. This led to social upheaval as, "the destruction of both sacred and secular spaces by the dam waters has permanently changed how the communities' history is remembered" (Abrampah, 2017, p. 297). Loss of human capital, among other livelihoods changes, have led to the resettled feeling "vulnerable and unprotected" and in some cases caused mass out-migration as the resettled simply "cannot take it anymore" (González-Parra & Simon, 2008, p. 1781; Sovacool & Bulan, 2011, p. 4853).

The post-livelihoods code is included in this sub-section because of the third way this

code was often used (see the sub-section on the natural category of livelihoods for the first two ways the code was used). Post-livelihoods also denoted when ownership of a profession changed. This often occurred when households went from owning and farming land to being sharecroppers or went from a subsistence existence to earning wages under an employer post-resettlement (Aiken & Leigh, 2015; Green & Baird, 2016; Sunardi, Gunawan, Manatunge, & Pratiwi, 2013).

The resettled also experienced declines in the human category of livelihoods in the form of miscommunication and a lack of transparency by dam authorities. The code *information transparency* denotes whether dam authorities provided incomplete or altered information to the communities on topics such as the resettlement process or the construction of the dam. This code, and the code *new site neighbors* in the social category of livelihoods, are the only codes that indicate an event inherent to the resettlement process as compared to the rest of the codes in Figure 3 which measured a post-resettlement outcome (such as decreased soil quality or increased access to health clinics). Therefore, the *code information transparency* highlights an external factor that can have influence over the other changes within the human category of livelihoods. This code measured instances of the resettled not given information about the SIA or RAP, how their compensation was calculated, how they would be resettled, what the government did with dam revenues, or even when the reservoir would be filled (Asiama et al., 2017; Thomas, 2012; Aiken & Leigh, 2015; Virtanen, 2006; Faure, 2003).

However, out of all the codes measuring changes to the human category of livelihoods for the resettled, decreases to health were the most common. In fact, increased health problems are so common among resettled communities that multiple studies focused just on this aspect (Rosa et al., 2018; Xi, 2016; Kedia, 2003). The list of potential health issues is long and

encompasses both decreases to physical health and mental well-being. In my dataset, I found increases in chronic diseases, infectious and zoonotic diseases, mental illness and diseases relating to pollution and contamination. Increases to chronic disease rates included increases in obesity, hypertension, heart disease, alcoholism, drug addiction, malnutrition, and asthma (Bisht, 2009; Rosa et al., 2018; González-Parra & Simon; 2008; Jing, 1997; Kedia, 2003). Infectious and zoonotic disease included increases in the prevalence of malaria, sexually transmitted diseases, dengue and typhoid fevers, hookworm, and cholera (Fearnside, 1999; Jackson & Sleigh, 2018; Kedia, 2003; Owusu et al., 2017). The resettled also have faced acute mercury contamination and bronchopneumonia from dam construction dust (Fearnside, 1999; Kedia, 2003). In fact, only three cases mentioned increases to human health for the resettled. These were decreases to child stunting and malnutrition, lower levels of anemia, and access to safer childbirth (Crooks et al., 2008; Erlanger et al.,2008; Siciliano et al., 2018)

There were also many cases that reported decreases in mental health. This ran the gamut from anxiety, depression, stress, and other psychological disturbances (Aiken & Leigh, 2015; Rosa et al., 2018; Hausermann, 2018; Hwang, Xi, Cao, Feng, & Qiao, 2007: Xi, 2016). In their study at the Foz de Chapecó hydroelectric plant, Rosa et al. (2018) provide damning evidence for the mental anguish brought on by resettlement. They quoted resettled respondents as saying, "we were upset and stressed in every imaginable way," "we cried a lot because of it all," and, "I went off into the woods to kill myself because I did not want to live here." (Rosa et al., 2018, p. 6-7).

4.6 Changes to livelihoods: the financial category of livelihoods

The resettled experienced decreases in financial capital. This manifested itself in three ways: 1) financial capital as measured by savings, credit, and inflows (decreased in 23 cases); 2)

income (decreased in 22 cases); and 3) income inequality (increased in three cases and decreased in three cases). In general, the resettled reported that their economic conditions worsened, their debt increased, and they were more reliant on government subsidies or remittances from families who had out-migrated post-resettlement (Akça et al., 2013; Bisht, 2009; Wilmsen & van Hulten, 2017; Tilt & Gerkey, 2016). This was especially startling because in 46 cases, the resettled received cash compensation for their lost assets. However, this money was often not enough to allow the resettled to replace that which was lost (Akça, et al., 2013; Nayak, 2010; Nakayama, 1998). In other cases, the cash was mismanaged because though it was given in one lump sum, the resettled were not accustomed to handling large amount of money (Aiken & Leigh, 2015; Mills-Tettey, 1989), and they did not receive any advice in how to invest or save the money. In some cases, the case was only given to community leaders or the male heads of households (Bermann, 2007; Fearnside, 1999; Bisht, 2009).

Compensation was also sometimes delayed for long periods of time, less than was originally promised by the dam authorities, or could not cover the purchase of new land as the value of land skyrocketed during dam construction (Thomas, 2002; Randell, 2016; Jing 1997; Akça, et al., 2013; Sunardi, et al., 2013). This is not to say that there were some cases where the resettled received cash compensation that seemed adequate to help them replace lost assets and begin a new life in their resettlement site (Wang, et al., 2013; Ty, et al., 2012; Obour, et al., 2016). However, the resettled were typically not satisfied with at least some part of the compensation amount and process (Jing, 1999; Lee, et al., 2015; Naithani & Saha, 2019). Therefore, despite cash compensation, the resettled's financial capital often declined post-resettlement

A common way financial capital decreased occurred when households, who were once

self-sufficient in food production from their land, had to increasingly rely on purchased food to survive post-resettlement (González-Parra & Simon, 2008; Obour et al., 2016). The second way the financial category of livelihoods decreased was through a reduction in income. Income dropped dramatically in several cases as communities lost access to their former means of survival such a fishing or cultivating cash crops (Beck et al., 2012; Bui et al., 2013; Thomas, 2002). As with every other aspect discussed so far, income is interwoven with other assets and activities that make up livelihoods, creating a negative feedback loop of diminished opportunity and capital. For example, among the resettled at the Lesotho Highlands Water Project, "communal assets have also been severely depleted, thereby threatening human security. The depletion of fuel resources, wild vegetables and medicinal plants…has not only led to losses in income, food, and energy, but also to cultural deprivation and a decline in … health standards" (Mwangi, 2007, p. 15). Finally, income inequality was not often reported on among cases and was shown to have mixed results. It decreased in three cases and increased in three cases. For example, Yankson et al. (2018) reported that the wealthy elites connected to the Bui Dam's construction grew richer while the poor grew even worse off, while Randell (2016) found that the gap between rich and poor decreased for the resettled as low-income households gained access to property, housing, and other assets.

4.7 Changes to livelihoods: social capital and activities

Finally, I will discuss the social category of livelihoods which is a large focus of this thesis. Social capital and the other assets, activities and access that make up this realm decreased across the board for the resettled. As mentioned previously, the *capital social* code is defined as "the kinship networks, associations, membership organizations and peer-group networks that

people can use in difficulties or turn to in order to gain advantage" (Allison & Horemans, 2006, p.758). Social capital was shown to have decreased in 23 cases. The other codes that showed decreases in this category include how trust changed among the resettled (2 cases), how cultural and community activities changed (11 cases), how connections among family and friends changed (12 cases), and whether the resettled were able to remain near their old neighbors (as measured by the code *new site neighbors*[11]), which did not happen in 9 cases. As discussed in the human category sub-section, culture is included within the social category of livelihoods. This is because cultural activities are often a common way that households and individuals within communities interact with each other and experience social connections.

The loss of social capital (which decreased in 23 cases out of the 23 cases that mentioned social capital) was often the cause of a litany of compounding issues for resettled communities in these cases. As households lost connections with other families and the networks that provided them with shared labor and a sense of community, other assets began to decline. The communities at the Manwan, Dachaoshan, Xiaowan, and Nuozhadu Dams in China experienced a decreased exchange of financial resources and agricultural labor post-resettlement; in fact, resettled households provided labor to one fewer family and give roughly four fewer days of labor during the previous year (Tilt & Gerkey, 2016). Like many resettled peoples, these communities already have thin margins in which to make a living. Any reduction in available labor reduces the chance a crop makes it to market, severely undermining a household's standard of living (Tilt & Gerkey, 2016). The Binh Dien Dam resettled reported decreases in close relationships, shared labor, and cooperation (Nguyen et al., 2017). Before resettlement, livestock

[11] As mentioned in the human category of livelihoods sub-section, this code indicates an event inherent to the resettlement process while the rest of the codes in Figure 3 (other than *information transparency*) measure a post-resettlement outcome. *New site neighbors* therefore highlights an external factor that can have influence over the other changes within this social category of livelihoods.

and seeds were readily shared among households. However, due to loss of income and because they were compensated with inadequate land for farming, resettled households focused on finding other sources of income instead of maintaining social connections and cooperating during agricultural production (Nguyen et al., 2017). At the Bakun Dam, decreased social capital created a cascading host of problems for the resettled: "as family, kin and community networks unraveled, powerlessness, dependency and vulnerability increased, generally resulting in downward socio-economic mobility" (Aiken & Leigh, 2015, p. 84).

In some cases, a loss of social capital was felt most acutely by women as access to networks for labor sharing, social obligations and friendship were eroded (Bisht, 2009; González-Parra & Simon, 2008). The resettled women at the Tehri Dam were restricted from many social activities and in some cases from even leaving their homes (Bisht, 2009). Because communities were resettled into an area with a more conservative culture, the traditional system of labor exchange among women largely disappeared (Bisht, 2009). Through these limits placed on women's social spaces, support systems and social networks declined (Bisht, 2009). Throughout these cases, declines in social capital have led to increases in conflict and ethnic tension, decreases in mental health, and loss of culture (Heggelund, 2006; Wilmsen et al., 2018; Xi, 2016; Choy, 2004). González-Parra and Simon (2008) summed up these issues succinctly; though they were referring to the Ralco Dam resettled community, they could be writing about many post-resettlement cases: "the community is only formally a community without the social relations required for an adequate community life" (p. 1786).

Like social capital, other assets, activities, and access to both that make up the social realm of livelihoods have decreased. Also, as with social capital, decreases in community trust (shown in two cases) and connections with others (decreased in 12 cases) snowballed into other

problems, exacerbating issues and contributing to a worsening quality of life. As elucidated by Bebbington (1999), this matches the depiction of social capital as the foundation of all other aspects of livelihoods. As discussed in the literature review, people's livelihoods are dependent on and built from social capital. Relationships and connections between community members are critical for households to access resources, and this access itself (whether it is to fisheries, the forest, or to education) is the most important resource in building sustainable livelihoods (Bebbington, 1999). Aiken and Leigh (2015) provided a poignant example of this, bringing to life Bebbington's (1999) arguments:

> A combination of conditions at the resettlement villages, including unemployment, poverty, and frayed family and community relationships, contributed to reported cases of increased idleness, alcoholism, indebtedness and other social problems. As longstanding and deep-rooted associations with places of historical and cultural value were severed or weakened and as social support networks came under increasing stress, many resettled indigenes appear to have suffered from emotional and psychological harm, including anxiety, despondency, personal insecurity and a sense of lost identity (p. 83).

The resettled's security, financial stability, and even health decline as social ties and connections with places of cultural significance were broken.

In 11 cases, the resettled reported declining cultural activities, ceremonies, and customs after losing places of historical significance and ancestral land to the flooding of the dam (Choy, 2004; Égré & Senécal, 2003; Kleinitz & Näser, 2011). As connections to old land and sacred spaces were lost, religious practices deteriorated (Wilmsen et al., 2018; Wiejaczka, Piróg, Tamang, & Prokop, 2018). In some cases, the resettled clashed with the differing cultures and religions of the host communities, furthering a sense of displacement and alienation for these

families (González-Parra & Simon, 2008; Xi, 2016). For example, at the Ralco Dam, the relationship between the resettled and their neighbors was marked by "mutual distrust"; the host community identified the resettled, who were indigenous, as "lazy, thieving drunks," while the resettled felt that the school's teachers and health clinic's staff showed preferential treatment to the host families (González-Parra & Simon, 2008, p. 1781). At the Three Gorges Dam, 99 percent of the resettled had communication problems because they did not know the host population's dialect, 68 percent felt they did not fit in because of different customs, and 32 percent said the host population was "not nice to them"(Xi, 2016, p. 82). Words like "extinct" and "died" were used by people among resettlement cases to describe how their former culture disappeared post-resettlement; resettlers bemoaned the loss of traditional ceremonies and communal gatherings. (Choy, 2004; Naithani & Saha, 2019).

Like cultural activities, connections among family and friends rapidly deteriorated in 12 cases post resettlement; this was exacerbated when households were not relocated near their old neighbors which occurred in nine cases (Leturcq, 2016; Ty et al., 2013). These connections were furthered frayed as people migrated to find work that was desperately lacking within their resettlement sites (Aiken & Leigh, 2015; Loker, 2003). Heggelund (2006) described the experiences of Three Gorges Dam resettlers that echoed sentiments across other resettlement cases: "when interaction between families is reduced, resettlers' obligations towards non-displaced kinsmen are eroded. When people live among strangers, communication is difficult, favors are not returned, and conflicts arise easily" (p. 189). Leturcq (2016) was able to quantify this deterioration among the Machadinho Dam resettled in Brazil; he found that pre-resettlement, 26 households visited other families between six and 10 times per month. After resettlement, only six families were able to visit others six to 10 times per month (Leturcq, 2016).

As both the quantity and quality of connections among the resettled decreased, problems ricocheted outward as households lost access to labor pools, information networks, and markets. But most critically, as these connections declined and social capital more broadly deteriorated, families lost the social support that forms the bedrock of strong friendships and comradery that makes living in a community both joyful and gratifying. When compounded with the pain and disruption of forced relocation, in many cases the resettled were set up for disappointment. As Heggelund (2006) argued, "[dam] authorities need to acknowledge that resettlement has social costs, that it is problematic for the relocatees when families and friends are split up and when the ancestral land has to be abandoned" (p.191). Unfortunately, this typically is often not considered during resettlement planning. Instead, communities are often broken up and shuffled around to wherever there is space to house them.

Without the networks and connections of their former homes, rebuilding livelihoods becomes close to impossible as families are forced to fend for themselves without the support of a community behind them. Abrampah (2017) eloquently summed up the gulf between resettled people's former lives and their new lives after displacement, "In short, the resettlement produced an overarching sense of displacement, social rupture, and loss, and the people of Bui village bear it all" (p. 299). The Bui village could be a stand in for so many villages and communities across the cases in this database. From the Amazon Rainforest to the Mekong River Basin to the Volta in West Africa, resettled peoples have struggled to remake themselves and their livelihoods in their new homes. With declines in social capital and the other assets, activities and access that make up a family's rich and sustaining way of life, the resettled in these cases are often set up for failure before they can even begin the arduous task of rebuilding their lives in an unfamiliar place.

4.8 Recommendations for research and resettlement plans

Though my research focused on resettled populations, the following recommendations are relevant for other dam impacted peoples, especially downstream communities. In some ways, being resettled is the best case scenario for impacted communities because the resettled as least get some form of compensation. Downstream communities, on the other hand, are often overlooked and receive little to no compensation despite major changes that can affect their livelihoods. However, even though resettlement could be considered the "best case scenario" for dam impacted people, my research shows that outcomes for the resettled are still often negative. This highlights the fact that communities living near dams, whether upstream, downstream or right at the dam site, rarely fare well after dam construction.

I recommend that future research surveys populations both before resettlement and after so that we have a better understanding of how the lives and livelihoods of the resettled change. Currently, most research relies on the resettled to remember their way of life before their relocation. This mode of research increases the risk of recall bias whereby the study population's recollections of the past are misremembered or skewed. Well-designed pre and post surveys would provide us with a more accurate gauge of post-resettlement changes and disruptions. I also recommend that future research follows communities at resettlement sites more than one generation post-resettlement. Perhaps with more time, the ability of the resettled to develop new livelihood strategies becomes more common. Though this research, we could develop a better understanding of how livelihoods can be maintained or adapted for resettled communities so that these practices could be replicated at other dam sites. This research would help answer the question of what aspects of the RAP are important for ensuring that resettled people can continue farming, fishing, or conducting the other livelihoods activities and strategies they utilized pre-

resettlement.

Finally, I advocate for more interdisciplinary research on resettled populations where researchers of different expertise and background, such as ecologists, sociologists, psychologists, economists, and anthropologists, collaborate to gain a more comprehensive understanding of the impacts to resettled populations. My research has highlighted the myriad ways the resettled may experience changes from health declines to fisheries decreases to the breakdown of social capital. A research team composed of multiple disciples has a better chance at being able to capture the multitude of post-resettlement changes and how these changes interact with each other. In tandem with this recommendation, I would also advocate for more sharing of research protocols, such as surveys and other data collection methods, among researchers so that we are better able to compare social impacts across dams and countries.

4.8.1 Recommendations for future research on social capital changes

In order to fully understand the scope and degree of changes to social capital, I recommend more researchers ask about these changes when studying and working with post-resettled communities. Of the 101 cases in this database, only 36 mentioned social capital or one of the other four codes in the social category of livelihoods. Though it could be true that the social category of livelihoods was not impacted in 65 cases, I suspect that it would be difficult for social capital *not* to be affected in at least some way during the often grueling process of resettlement. Social capital changes among resettled populations may be undercounted or understudied for a variety of reasons. Researchers may not have the expertise to ask about these potential changes, and instead focus on more "tangible" changes to livelihoods such as those impacting natural, financial or physical capital.

However, understanding social capital changes among the resettled is critical to

recognizing the broader scope of how the livelihoods of households and communities have changed. Social capital is the foundation of livelihoods as it helps manage how households access other assets and activities (Bebbington, 1999). Therefore, understanding how social capital changes is the first step to addressing and mitigating negative impacts to other areas in their lives. Essentially, helping communities to maintain social capital post-resettlement will go a long way in increasing the chance that they will able to retain their former livelihoods. But beyond this practical application, ensuring the maintenance of social capital can ease the pain and trauma of forced relocation and the loss of former land and homes. But first, we need to have a better understanding of just how social capital, along with the other activities and access that make up the social category of livelihoods, are impacted by resettlement. I recommend that researchers report on the following when studying post-resettlement communities:

1. Were the resettled able to continue living by former neighbors?
2. What is the type of resettlement site (intact, communities mixed together, resettled into a host community, mixed and resettled into a host community, or scattered throughout multiple site types)?[12]
3. Did the resettled have any choice about who they lived by?
4. Did the number of groups, networks, and organizations that each resettled household change after resettlement? How did this change?
5. Have cultural, religious and other community activities changed?
6. How often do the resettled see friends and family compared to pre-resettlement?
7. Has the quality of connections with friends and family changed?
8. Has trust among community members changed?

[12] As mentioned in the literature review, only 17 cases were coded for these site types. I argue that this is important knowledge to have in order to understand how a community's social capital has changed post-resettlement.

9. Have there been differences in the way men and women are impacted by changes to social capital?

Finally, I recommended, when possible, that researchers collect data on social capital both before and after resettlement to prevent recall bias among the participants and provide a more accurate measure of how social capital changes during the resettlement process.

4.8.2 Recommendations for future resettlement planning

Based on the research in this meta-analysis, dam authorities should prioritize processes that help maintain the assets, activities and access to these assets and activities that make up the livelihoods of the resettled. As mentioned previously, many household's livelihoods are dependent on social capital, so taking steps to help maintain social capital post-resettlement will help the resettled preserve their livelihoods overall. As out-migration is a key way communities lose members which contributes to a decline in social cohesion (Aiken & Leigh, 2015; Owusu et al., 2017; Loker, 2003), adequate employment and other means to make a living need to be in place in the resettlement site to reduce the need of out-migration for work. Access to sacred spaces, shrines, and other important sites to the community are often denied to the resettled or disappear after the reservoir floods (Abrampah, 2017; Égré & Senécal, 2003). Access should be maintained as much as possible to allow the resettled to continue practicing cultural and religious activities; every effort to relocate historical relics and cultural spaces should be made in order to preserve in some small way the ties the resettled had to the former place of living. As connections among friends and family can fray post-resettlement (Naithani & Saha, 2019; Leturcq, 2016), the resettled should have a choice of who they live by, and families and former neighbors should be resettled together as much as possible. This choice implies that the resettlement should be given every opportunity to participate in the resettlement planning

process. Through consultation and negotiations, the resettled should be given choices each step of the way in how and with what they will be compensated with, how they will transition, to their new homes, and what ways they will be able to maintain or adapt their livelihoods. This choice should be given to as many resettled individuals as possible, not just the household heads or the leaders of the communities, as has occurred in some resettlement cases (Abbink, 2012; Asiama et al., 2017). Instead, each resettled adult should have as much information as others to choose how and where they will be resettled.

Resettlement often leads to the disintegration of professional and social networks, labor sharing practices, and organization membership (Nguyen et al., 2017; Tilt & Gerkey, 2016; Ty et al., 2003). It can be difficult for resettled households to contribute to networks and labor pools when they are struggling to simply stay afloat and concentrate on rebuilding former livelihoods. By providing adequate compensation including training, agricultural inputs, technology, and other tools, dam authorities can make it easier for households to quickly re-establish themselves and focus on rebuilding the networks that sustained their communities pre-resettlement. The difficulty of resettlement strains social capital at a time it is most critically needed to help communities recover from the shock of relocation. Dam authorities need to eliminate as many stressors to social capital as they can in order to ensure the community has the best chance of thriving post-resettlement. In tandem with this recommendation, I advocate for more robust monitoring and evaluation of resettlement communities by the dam authorities. This process should be included and allocated for in the RAP itself so that it does not get overlooked. This monitoring and evaluation piece could go hand in hand with long term support, where the resettled are provided with opportunities for job assistance and employment, support for livelihoods adaptions, and education for the resettled children. This support would grow and

adapt based on the changing needs of the resettled as they work to re-establish themselves in their new homes.

5. CONCLUSION

Our database is limited by what researchers report through their research questions and methods. Simply because a study does not mention whether something occurred does not mean that the resettled did not experience it. Our database also only accounts for research published in peer reviewed journals in English. Perhaps many authors are publishing in their own languages or in the languages of the countries where the dams are being constructed so that they can be more useful for the activists and policy makers there. This is important to keep in mind as a meta-analysis is limited to both what is reported and what is published in English. Finally, though our codebook is comprehensive and covers a wide range of experiences and changes the resettled may face, it is not exhaustive. Resettlement cases vary enormously across time and regions; there are occasionally rare events and changes that resettled populations face that we do not have codes for such as wild animal conflict or death by flash flood. There are therefore events the resettled experienced that may not be captured during our coding process.

However, I am confident that our codebook captures many of the intricacies of the resettled experience, especially changes to livelihoods. The meta-analysis provides us with a good understanding of what is happening within the resettled communities since it captures patterns and trends across many cases from around the world. I, together with the other researchers on this study, plan to publish a paper from this thesis with the hope of more research and published papers in the future from the database we created. Though the meta-analysis for this thesis covers 69 studies, the other researchers in the team will expand the analysis to include all 146 studies in the database. From this, we hope to provide further evidence of which factors during resettlement are associated with changes to livelihoods and answer other research questions.

Resettled communities are often not able to maintain their livelihoods and social capital. Instead, they are thrown into communities where their neighbors are strangers, they lose connection to the fisheries and land they once farmed, they are compensated far less than their lost assets were worth, and they are largely forgotten as countries focus instead on increasing energy sources for their urban populations. These trends have left millions of people around the globe impoverished, displaced, and disconnected from their homes and communities. Indian Prime Minister Nehru, when speaking in 1948 to the displaced communities at the Hirukud Dam exclaimed, "If you are to suffer, you should suffer in the interest of your country" (Roy, 1999). Tilt et al. (2009) argued that "the impacted population [resettled people] effectively subsidizes … international development" (p. 251). Today, resettled communities around the world are indeed effectively subsidizing their country or the region's development when they are pushed aside during dam construction and the resettlement process. In fact, as Chinese firms have grown to be the largest builders and funders of dams today with roughly 380 large dams in more than 70 countries planned for, under construction, or operating, dam impacted communities are now more than ever subsidizing regional development (Siciliano, Del Bene, Scheidel, Lui, & Urban, 2019). Chinese firms package together aid, trade and investment while maintaining a laissez-faire policy of not requiring many political, environmental or social conditions of the dam host country (Siciliano et al., 2019). These trends have led to myriad environmental justice concerns such as building dams in ecologically fragile areas, unfair distribution of energy, little transparency and accountability for the builders, and conflict as local cultures and values are ignored (Siciliano et al., 2019).

But these trends do not have to continue. In a radical reversal of the current system where the resettled subsidizes the region's development, those that receive the dam produced energy

could subsidize the resettled instead. If the communities and industries that utilize the dam's electricity paid for its true cost, they would pay to effectively compensate the resettled so that they could retain their livelihoods and thrive in their new homes. As large dam construction booms in the Global South, improving the resettlement and compensation processes will ensure that communities will no longer be dismissed as the inevitable casualties of development and relegated to impoverishment. Instead, they will be looked upon as partners in the resettlement process where their lives and livelihoods are treated with the dignity and respect deserved by all.

APPENDICES

APPENDIX A

Database studies included in this thesis

(cases per study in parenthesis)

Abbink, J. (2012). Dam controversies: Contested governance and developmental discourse on the Ethiopian Omo River dam. *Social Anthropology*, *20*(2), 125–144. **(1 case)**

Abrampah, D. A. M. (2017). Strangers on their own land: Examining community identity and social memory of relocated communities in the area of the Bui Dam in West-central Ghana. *Human Organization*, *76*(4), 291–303. **(1 case)**

Aiken, S. R., & Leigh, C. H. (2015). Dams and indigenous peoples in Malaysia: Development, displacement and resettlement. *Geografiska Annaler: Series B, Human Geography*, *97*(1), 69–93. **(2 cases)**

Akça, E., Fujikura, R., & Sabbağ, Ç. (2013). Atatürk Dam resettlement process: Increased disparity resulting from insufficient financial compensation. *International Journal of Water Resources Development*, *29*(1), 101–108. **(2 cases)**

Asiama, K., Lengoiboni, M., & van der Molen, P. (2017). In the land of the dammed: Assessing governance in resettlement of Ghana's Bui Dam Project. *Land*, *6*(4), 80. **(1 case)**

Barrow, C. (1988). The impact of hydroelectric development on the Amazonian environment: With particular reference to the Tucuruí Project. *Journal of Biogeography*, 67–78. **(1 case)**

Beck, M. W., Claassen, A. H., & Hundt, P. J. (2012). Environmental and livelihood impacts of dams: Common lessons across development gradients that challenge sustainability. *International Journal of River Basin Management*, *10*(1), 73–92. **(2 cases)**

Berman, C. (2007). Impasses and controversies of hydroelectricity. *Estudos Avançados*, *21*(59), 139–154. **(1 case)**

Bisht, T. C. (2009). Development-induced displacement and women: The case of the Tehri Dam, India. *The Asia Pacific Journal of Anthropology*, *10*(4), 301–317. **(1 case)**

Bui, T. M. H., Schreinemachers, P., & Berger, T. (2013). Hydropower development in Vietnam: Involuntary resettlement and factors enabling rehabilitation. *Land Use Policy*, *31*, 536–544. **(1 case)**

Choy, Y. K. (2004). Sustainable development and the social and cultural impact of a dam-induced development strategy: the Bakun experience. *Pacific Affairs*, *77*(1), 3,50-68. **(1 case)**

Crooks, D. L., Cliggett, L., & Gillett-Netting, R. (2008). Migration following resettlement of the Gwembe Tonga of Zambia: The consequences for children's growth. *Ecology of Food and Nutrition*, *47*(4), 363–381. **(1 case)**

Égré, D., & Senécal, P. (2003). Social impact assessments of large dams throughout the world: Lessons learned over two decades. *Impact Assessment and Project Appraisal*, *21*(3), 215–224. **(3 cases)**

Erlanger, T. E., Sayasone, S., Krieger, G. R., Kaul, S., Sananikhom, P., Tanner, M., Odermatt, P. & Utzinger, J. (2008). Baseline health situation of communities affected by the Nam Theun 2 hydroelectric project in central Lao PDR and indicators for monitoring. *International Journal of Environmental Health Research*, *18*(3), 223–242. **(1 case)**

Faure, A. (2003). Improving public information about large hydroelectric dams: Case studies in France and West Africa. In *Natural resources forum* (Vol. 27, pp. 32–41). Wiley Online Library. **(1 case)**

Fearnside, P. M. (1999). Social impacts of Brazil's Tucuruí dam. *Environmental Management*, *24*(4), 483–495. **(1 case)**

Finley-Brook, M., & Thomas, C. (2011). Renewable energy and human rights violations: Illustrative cases from indigenous territories in Panama. *Annals of the Association of American Geographers*, *101*(4), 863–872. **(2 cases)**

Fratkin, E. (2014). Ethiopia's pastoralist policies: Development, displacement and resettlement. *Nomadic Peoples*, *18*(1), 94–114. **(1 case)**

González-Parra, C., & Simon, J. (2008). All that glitters is not gold: Resettlement, vulnerability, and social exclusion in the Pehuenche community Ayin Mapu, Chile. *American Behavioral Scientist*, *51*(12), 1774–1789. **(1 case)**

Green, W. N., & Baird, I. G. (2016). Capitalizing on compensation: Hydropower resettlement and the commodification and decommodification of nature-society relations in Southern Laos. *Annals of the American Association of Geographers*, *106*(4), 853–873. **(1 case)**

Habich, S. (2015). Strategies of soft coercion in Chinese dam resettlement. *Issues and Studies*, *51*(1), 165–199. **(1 case)**

Hall, A., & Branford, S. (2012). Development, dams and Dilma: The saga of Belo Monte. *Critical Sociology*, *38*(6), 851–862. **(1 case)**

Hausermann, H. (2018). "Ghana must Progress, but we are Really Suffering": Bui Dam, antipolitics development, and the livelihood implications for rural people. *Society and Natural Resources*, *31*(6), 633–648. **(2 cases)**

Heggelund, G. (2006). Resettlement programmes and environmental capacity in the Three Gorges Dam Project. *Development and Change*, *37*(1), 179–199. **(1 case)**

Hernández-Ruz, E., Silva, R., & do Nascimento, G. (2018). Impacts of the construction of the Belo Monte Hydroelectric Power Plant on traditional knowledge of riverine communities in Xingu River, Pará, Brazil. *International Journal of Research Studies in Biosciences, 6*(6), 13-20. **(1 case)**

Huang, Y., Lin, W., Li, S., & Ning, Y. (2018). social impacts of dam-induced displacement and resettlement: A comparative case study in China. *Sustainability*, *10*(11), 4018. **(2 cases)**

Hwang, S.-S., Xi, J., Cao, Y., Feng, X., & Qiao, X. (2007). Anticipation of migration and psychological stress and the Three Gorges Dam project, China. *Social Science & Medicine*, *65*(5), 1012–1024. **(1 case)**

Jackson, S., & Sleigh, A. (2000). Resettlement for China's Three Gorges Dam: Socio-economic impact and institutional tensions. *Communist and Post-Communist Studies*, *33*(2), 223–241. **(1 case)**

Jing, J. (1999). Villages dammed, villages repossessed: A Memorial movement in northwest China. *American Ethnologist*, *26*(2), 324–343. **(3 cases)**

Jing, J. (1997). Rural resettlement: past lessons for the Three Gorges project. *China Journal*, *38*(38), 65–92. **(6 cases)**

Johnston, B. R. (2010). Chixoy dam legacies: The struggle to secure reparation and the right to remedy in Guatemala. *Water Alternatives*, *3*(2), 341. **(1 case)**

Kedia, S. (2003). Assessing and mitigating the health impacts of involuntary resettlement: The Tehri hydroelectric dam project. *Advances in Science and Technology of Water Resources*, *23*, 65–68. **(1 case)**

Kleinitz, C., & Näser, C. (2011). The loss of innocence: Political and ethical dimensions of the Merowe Dam Archaeological Salvage Project at the Fourth Nile Cataract (Sudan). *Conservation and Management of Archaeological Sites*, *13*(2–3), 253–280. **(1 case)**

Lee, W. C., Viswanathan, K. K., & Ali, J. (2015). Compensation policy in a large development project: The case of the Bakun hydroelectric dam. *International Journal of Water Resources Development*, *31*(1), 64–72. **(1 case)**

Legese, G., Van Assche, K., Stelmacher, T., Tekleworld, H., & Kelboro, G. (2018). Land for food or power? Risk governance of dams and family farms in Southwest Ethiopia. *Land Use Policy*, *75*, 50–59. **(1 case)**

Leturcq, G. (2016). Differences and similarities in impacts of hydroelectric dams between north and south of Brazil. *Ambiente & Sociedade*, *19*(2), 265-286. **(3 cases)**

Loker, W. M. (2003). Dam Impacts in a time of globalization: Using multiple methods to document social and environmental change in rural Honduras. *Current Anthropology*, *44*, S112–S121. **(1 case)**

McDonald, B., Webber, M., & Yuefang. (2008). Involuntary resettlement as an opportunity for development: The case of urban resettlers of the Three Gorges Project, China. *Journal of Refugee Studies*, *21*(1), 82–102. **(2 cases)**

Mills-Tettey, R. (1989). African resettlement housing: A revisit to the Volta and Kainji schemes. *Habitat International*, *13*(4), 71–81. **(2 cases)**

Morvaridi, B. (2004). Resettlement, rights to development and the Ilisu dam, Turkey. *Development and Change*, *35*(4), 719–741. **(1 case)**

Mwangi, O. (2007). Hydropolitics, ecocide and human security in Lesotho: A case study of the Lesotho Highlands Water project. *Journal of Southern African Studies*, *33*(1), 3–17. **(1 case)**

Naithani, S., & Saha, A. K. (2018). Changing landscape and ecotourism development in a large dam site: A case study of Tehri dam, India. *Asia Pacific Journal of Tourism Research*, 1–13. **(1 case)**

Nakayama, M. (1998). Post-project review of environmental impact assessment for Saguling Dam for involuntary resettlement. *International Journal of Water Resources Development*, *14*(2), 217–229. **(1 case)**

Nayak, A. K. (2010). Big dams and protests in India: A study of Hirakud Dam. *Economic & Political Weekly*, *xlv*(2), 69–73. **(1 case)**

Nguyen, H., Pham, T., & Lobry de Bruyn, L. (2017). Impact of hydroelectric dam development and resettlement on the natural and social capital of rural livelihoods in Bo Hon Village in Central Vietnam. *Sustainability*, *9*(8), 1422. **(1 case)**

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Rana, N., Sati, S. P., Sundriyal, Y. P., Doval, M. M., & Juyal, N. (2007). Socio-economic and environmental implications of the hydroelectric projects in Uttarakhand Himalaya, India. *Journal of Mountain Science*, *4*(4), 344–353. **(1 case)**

Randell, H. (2017). Forced migration and changing livelihoods in the Brazilian Amazon. *Rural Sociology*, *82*(3), 548–573. **(1 case)**

Randell, H. (2016). Structure and agency in development-induced forced migration: The case of Brazil's Belo Monte Dam. *Population and Environment*, *37*(3), 265–287. **(2 cases)**

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Siciliano, G., & Urban, F. (2017). Equity-based natural resource allocation for infrastructure development: Evidence from large hydropower dams in Africa and Asia. *Ecological Economics*, *134*, 130–139. **(2 cases)**

Siciliano, G., Urban, F., Tan-Mullins, M., & Mohan, G. (2018). Large dams, energy justice and the divergence between international, national and local developmental needs and priorities in the global South. *Energy Research & Social Science*, *41*, 199–209. **(3 cases)**

Singer, J., & Watanabe, T. (2014). Reducing reservoir impacts and improving outcomes for dam-forced resettlement: Experiences in central Vietnam. *Lakes & Reservoirs: Research and Management*, *19*(3), 225–235. **(1 case)**

Souksavath, B., & Nakayama, M. (2013). Reconstruction of the livelihood of resettlers from the Nam Theun 2 hydropower project in Laos. *International Journal of Water Resources Development*, *29*(1), 71–86. **(1 case)**

Sovacool, B. K., & Bulan, L. C. (2011). Behind an ambitious megaproject in Asia: The history and implications of the Bakun hydroelectric dam in Borneo. *Energy Policy*, *39*(9), 4842–4859. **(1 case)**

Sunardi, Gunawan, B., Manatunge, J., & Pratiwi, F. D. (2013). Livelihood status of resettlers affected by the Saguling Dam project, 25 years after inundation. *International Journal of Water Resources Development*, *29*(1), 25–34. **(2 cases)**

Thomas, K. J. A. (2002). Development projects and involuntary population displacement: The World Bank's attempt to correct past failures. *Population Research and Policy Review*, *21*(4), 339–349. **(1 case)**

Tilt, B., & Gerkey, D. (2016). Dams and population displacement on China's Upper Mekong River: Implications for social capital and social-ecological resilience. *Global Environmental Change*, *36*, 153–162. **(4 cases)**

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Wang, P., Wolf, S. A., Lassoie, J. P., & Dong, S. (2013). Compensation policy for displacement caused by dam construction in China: An institutional analysis. *Geoforum*, *48*, 1–9. **(3 cases)**

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APPENDIX B

Table 4. Modified Codebook

Code	Definition	How to Measure	Rules
Cost	Total cost of dam construction mentioned by authors. With the reference of the year (beginning of the project, at the end, or the publication year)	Millions of dollars	It is preferable to code the cost of the dam (amount) in US dollars. But if the authors just indicate the amount in a different currency, please code the number and the currency the first time that authors mentioned in the paper the cost of the dam, including the abstract.
Dam Builder	Name of who built the dam	Name	Code the name of the dam builders just the first time that the authors mentioned in the paper, including the abstract.
Dam Complex	Whether the dam is part of a complex of nearby dams	Yes No	Code the word(s) describing if the dam is part of a complex. Please code the first time that authors refer to it, including the abstract
Dam Construction end date	Year for dam construction completion	Year	Code the year when the dam construction ended. Please code just the first time that authors refer to it, including the abstract
Dam Construction start date	Year for dam construction start	Year	Code the year when the dam construction began. Please code just the first time that authors refer to it, including the abstract
Dam Location Country	The country the dam is in	Name	Code the country where the dam is located. Please code just the first time that authors refer to it, including the abstract. Do not code if it appears in the title.
Dam Name	Name of the dam	Name	Code the name of the dam. Please code just the first time that authors refer to it, including the abstract. Do not code if it appears in the title.
Dam Power output	How much power the dam generates or will generate per year	Power units	Code the number and the units that refers to the power output of the dam. Please code just the first time that authors refer to it, including the abstract
Dam River Basin	The river basin the dam is in	Name	Code the name of the basin. Please code just the first time that authors refer to it, including the abstract. Only code this if the authors use the word river or basin.

Table 4. (cont'd)

Dam Stage	Stage of dam construction during research	planning construction operation	Code the sentence that describes the stage of construction of the dam. Please code just the first time that authors refer to it, including the abstract
Investor Nationality	Nationality of investor that funded the dam	Country	Code the name of the investor country. Please code just the first time that authors refer to it, including the abstract
Investor World Bank	If the World Bank helped to fund the dam construction	Yes No	Code the sentence describing that the World Bank funded the dam. Please code just the first time that authors refer to it, including the abstract
Resettled actual number	Number of people or households actually resettled	Number of people Number households	Please code the number (exact number) of actual people or households. Please code the first time that authors refer to it, including the abstract. Code the number and if they are talking about people or households.
Resettled planned number	Number of people or households that are planned to be resettled	Number of people Number households	Please code the number (exact number) of planned people or households resettled. Please code just the first time that authors refer to it, including the abstract. Code the number and if they are talking about people or households.
Compensation recommendations	Recommendations for compensation made by the author(s)	Description	Please code the sentences that describe the recommendations made by the authors regarding compensation. Code only clearly stated recommendations.
Resettlement recommendations	Recommendations for resettlement made by the author(s)	Description	Please code the sentences that describe the recommendations made by the authors regarding resettlement. Code only clearly stated recommendations.
Study focus	Classification of the paper for the meta-analysis	Compensation Resettlement Both	Please code the whole title of the paper, indicating whether the paper focus is resettlement, compensation or both.
Study Longitudinal	Whether the study covers more than one time period	Description	Please code the sentence that describes that the study was longitudinal. Please code just the first time that authors refer to it, including the abstract
Study Longitudinal timeframe	For longitudinal studies: the span of time between the first and the last date for data collection.	Year(s)	Code the year of the first data collection and the year of the last data collection.
Study Longitudinal sample track	How researchers kept track of their population for longitudinal studies	Description	Please code the sentence describing how the authors kept track of their sample in longitudinal studies. Please code just the first time that authors refer to it, including the abstract

Table 4. (cont'd)

Study Type	Description of the study n	Case study Large n Comparative case study other	Please code the type of study that the researchers conducted.
Study Multiple dams	If the study covers resettlement and/or compensation for more than one dam	Yes No	Please code the sentence describing if the study is researching more than one dam. Please code just the first time that authors refer to it, including the abstract
Study number of participants	Number of (whatever the unit of analysis is such as people or households) that participated in the study	# of whatever the unit of analysis is. e.g. # people, or # households	Please code the number of people who participated in the research. Please code just the first time that authors refer to it, including the abstract. Indicate the number and the way that they participated.
Study population	The population focus of the study	Indigenous Riverine Campesinos/Peasants Other	Please code the sentence describing the population focus of the study. Please code just the first time that authors refer to it, including the abstract
Study framework	Theory used by researchers to guide their study and methods	Name	Code the name of the theoretical framework(s) used in the study.
Study time	When information was collected for study	Year(s)	Code the year when the study was conducted. Please code just the first time that authors refer to it, including the abstract. Do not use this code when the study is longitudinal.
Study Unit of analysis	Type of group being studied	individual household/families community Other	Please code the word describing the unit of analysis. If they mention household heads its individual. Please code just the first time that authors refer to it, including the abstract
Type of participants	The type of people that participated in the study	People resettled due to dam People compensated due to dam Host communities Dam authorities Government actors NGO's actors Other	Code the sentence describing the type of participants. Please code just the first time that authors refer to it, including the abstract

Table 4. (cont'd)

Immigrants	Competition between the affected and immigrants to the area affected by dam construction	Yes No	Code the sentence that describe any kind of competition between affected and outside immigrants. Please do not code conflict between host communities and resettled communities.
new site type	Due to pre-resettlement and pre-compensation characteristics (such as status, livelihoods, legal land ownership, demographics, etc.), affected communities have different opportunities	Yes No	Code the sentence describing the different opportunities that people have due to characteristics.
Post Employment	Whether access to employment changed after resettlement and/or compensation	Increased Decreased Stayed the same	Code the sentence describing the change in the access of employment. It could also be a number or a percentage. Please be careful, if it is a percentage, code the number in a way that we are going to be able to analyze.
Post Income	Whether income changed post resettlement and/or compensation (can include words like changes in economic/financial security)	Increased Decreased Stayed the same	Code the sentence describing the change in income. this can be a number or a percentage. Please be careful if it is a percentage code the number in a way that we are going to analyze.
Post Income inequality change	Whether income inequality changed post resettlement and/or compensation	Increased Decreased Stayed the same	Code the sentence describing the change in income inequality. this can be a number or a percentage. Please be careful if it is a percentage code the number in a way that we are going to analyze.
Post Livelihoods	If livelihoods changed post-resettlement and/or compensation (fishing, farming, or other). Livelihoods are partially subsistence, not fully focused on generating income but also for survival.	Yes No	Code the sentence describing if livelihoods changed post resettlement or compensation
Post Standard of living	If the authors said their standard of living changed post-resettlement and/or compensation	Increased Decreased Stayed the same	Code the sentence describing a change in people's standard of living. Use this code just when the author mentions a change in standard of living.
Benefits	If there were unexpected benefits to the economy in the local area or at national level due to the dam	Local: Yes; No National: Yes; No	Code the sentence describing the benefits in the region due to the dam construction

Table 4. (cont'd)

Problems	If there were unexpected problems to the economy in the local area or at national level due to the dam	Local: Yes; No National: Yes; No	Code the sentence describing the problems in the region due to the dam
Compensation choice	Whether the affected were given choice of how/what they would be compensated with	Yes No	Code the sentence describing if participants were given choice of how and what they would be compensated.
Compensation consultation and info	Whether the affected were consulted and/or informed during the process about compensation. Consultation refers to "being asked an opinion in specific matters without guarantee of influencing decisions" (Agarwal, 2001; p1624)	Yes No	Code the sentence describing if affected people were consulted
Compensation expectations positive	If the affected people's expectations of compensation were different than what they received. In this case they got better things that they expected.	Yes No	Code the sentence describing that people got better things than expected
Compensation expectations negative	If the affected people's expectations of compensation were different than what they received. In this case they got worst things that they expected.	Yes No	Code the sentence describing that people got worse things than expected
Compensation participation	If the affected participated in compensation planning and process (used when authors don't give details about HOW they participated)	Yes No	Code the sentence describing if affected people were able to participate in the planning and process of compensation.
Compensation negotiation	If affected people were able to negotiate on compensation	Yes No	Code the sentence describing if affected people were able to negotiate the compensation.
Information transparency	Whether the authors mention that information shared to affected communities was incomplete/altered	Yes No	Code the sentence describing the presence or lack of transparency of information
Post participation	If the affected participated in decisions after they have been resettled/compensated (already resettled/compensated, but decisions on this process continue)	Yes No	Code the sentence describing if affected participate in decisions after the resettlement/compensation process

Table 4. (cont'd)

Resettlement choice	If resettled were given choice of how/where to resettle	Yes No	Code the sentence that describes if participants were given choices of how/where to resettle
Resettlement negotiations	If resettled were able to negotiate on resettlement. Affected people were able to give ideas about their resettlement	Yes No	Code the sentence describing if people resettled was able to negotiate the resettlement
Resettlement expectations positive	If the affected people's expectations of resettlement were different than what they received. In this case they got better things that they expected.	Yes No	Code the sentence describing that people got better things than expected
Resettlement expectations negative	If the affected people's expectations of resettlement were different than what they received. In this case they got worst things that they expected.	Yes No	Code the sentence describing that people got worse things than expected
Resettlement consultation and info	If resettled were informed and/or consulted during the resettlement process about resettlement. Consultation refers to "being asked an opinion in specific matters without guarantee of influencing decisions" (Agarwal, 2001; p1624)	Yes No	Code the sentences describing if resettled were consulted
Resettlement delay	If there was a delay between when resettlement was supposed to happen and when it happened	Yes No	Code the sentence describing the time delay of resettlement
Resettlement participation	If the resettled participated in resettlement planning and process (used when authors don't give details about HOW they participated)	Yes No	Code the sentence describing if resettlers participate in decisions after the resettlement process
Capital Human	If authors say human capital has changed. Human Capital: people's capabilities in terms of their health, labor, education, knowledge, skills (Allison, et al., 2006)	Increased Decreased Stayed the same	Depending on the information provided by the authors code numbers describing the increase, decrease of human capital. and/or code sentences describing it.

Table 4. (cont'd)

Capital Natural	If authors say natural capital has changed. Natural Capital: fish stocks, land owned, crops cultivated, etc. (Allison et al., 2006)	Increased Decreased Stayed the same	Depending on the information provided by the authors code numbers describing the increase, decrease of natural capital. and/or code sentences describing it.
Capital Financial	If authors say financial capital has changed such as Savings, credit, and inflows	Increased Decreased Stayed the same	Depending on the information provided by the authors code numbers describing the increase, decrease of financial capital. and/or code sentences describing it.
Capital Physical	If authors say physical capital has changed such as agricultural and business equipment, houses, consumer durables, vehicles and transportation, water supply and sanitation facilities, and communications infrastructure (Allison & Ellis, 2001; Meizen-Dick et al., 2014)	Increased Decreased Stayed the same	Depending on the information provided by the authors code the sentence describing the increase, decrease of physical capital.
Capital Social	If authors say social capital has changed such as membership in organizations and groups, social and professional networks. (Allison & Ellis, 2001; Meizen-Dick et al., 2014)	Increased Decreased Stayed the same	Depending on the information provided by the authors code the sentence describing the increase, decrease of social capital.
Post Community trust	Whether trust among community members changed post-resettlement and/or compensation	Increased Decreased Stayed the same	Depending on the information provided by the authors code the sentence describing the increase, decrease of community trust.
Post Cultural activities	Whether cultural and community activities changed post-resettlement and/or compensation	Increased Decreased Stayed the same	Depending on the information provided by the authors code the sentence describing the increase, decrease of cultural activities
Post family and friend connections	Whether connections with relatives and friends changed post resettlement and/or compensation	Increased Decreased Stayed the same	Depending on the information provided by the authors code the sentence describing the increase, decrease of family and friends connections
Post Status assets	If social status (the importance of a person in relation to other people within the community) based on assets changed post resettlement and/or compensation	Yes No	Depending on the information provided by the authors code the sentence describing if social status changed

Table 4. (cont'd)

Post Status prestige	If social status based on prestige (person's reputation) changed post resettlement and/or compensation	Yes No	Depending on the information provided by the authors code the sentence describing if social status prestige changed
Electricity access before	If resettled and/or compensated had access to electricity before	Yes No	Code the sentence describing if people had access to electricity before the resettlement or compensation
Electricity access after resettlement	If resettled and/or compensated have access to electricity after the resettlement	Yes No	Code the sentence describing if people got access to electricity after being resettled.
Energy bills before	Whether the resettled or compensated had energy bills before resettlement	Yes No	Code the sentence describing if people had or not energy bills before resettlement or compensation
Energy bills now	If the resettled and/or compensated had energy bills before, how electricity bills changed post-resettlement and/or compensation	Increased Decreased Stayed the same	Code the change in electricity bills this can be a number, percentage or a sentence. If percentage remember to code in a way that we will know afterwards that was a percentage
New site type	Resettled site type before and resettled site type after	Rural to Rural rural to urban Urban to Urban urban to rural	Code the sentence describing the change of site of resettlers
Post Cooking	If the way people cooked changed post resettlement and/or compensation	Yes No	Code the sentence describing any change or not in cooking types
Post Crop yield	How much crop yield changed post resettlement and/or compensation	Increased Decreased Stayed the same	Code the sentence describing the change in yield. This can also be presented in numbers or percentages. Remember to code the necessary information in case of percentages
Post Crops	If crop species grown changed post resettlement and/or compensation	Yes No	Code the sentence describing change of crop species.
Post Soil	How soil quality changed post resettlement and/or compensation	Increased Decreased Stayed the same	Code the change in soil quality. This can be a number, percentage or a sentence. If percentage remember to code in a way that we will know afterwards that was a percentage

Table 4. (cont'd)

Post Food access	If access food changed (for example if they used to plant their food but now must buy food from a store, etc.) post resettlement and/or compensation. Food access is defined by the ability of individuals to obtain adequate resources, including traditional entitlements to acquiring appropriate foods for a nutritious diet. (FAO, 2006).	Yes No	Code the sentence describing a change in food access
Post Food security	How food security changed post resettlement and/or compensation. "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2006).	Increased Decreased Stayed the same	Code the change in food security. This can be a number, percentage or a sentence. if percentage remember to code in a way that we will know afterwards that was a percentage
Post Fish quantity	How fish quantity/levels changed post resettlement and/or compensation	Increased Decreased Stayed the same	Code the change in fish quantity. This can be a number, percentage or a sentence. if percentage remember to code in a way that we will know afterwards that was a percentage
Post Fisheries access	If access (distance, physical barriers, loss of equipment etc.) to fisheries changed post resettlement and/or compensation	Increased Decreased Stayed the same	Code the change in fisheries access. This can be a number, percentage or a sentence. if percentage remember to code in a way that we will know afterwards that was a percentage
Post natural products quantity	How forest products changed post resettlement and or compensation. Do not code when authors are referring to fisheries	Increased Decreased Stayed the same	Code for the change in the quantity of forest products after resettlement or compensation. If percentage remember to code in a way that we will know afterwards that was a percentage

Table 4. (cont'd)

Post natural areas and natural products access	If access (distance, physical barriers, loss of equipment etc.) to natural areas and natural products changed post resettlement and/or compensation. Do not code when authors are referring to fisheries	Increased Decreased Stayed the same	Code the change in forest products access. This can be a number, percentage or a sentence. If percentage remember to code in a way that we will know afterwards that was a percentage.
Post water quality	How water quality has change post resettlement and or compensation.	Increased Decreased Stayed the same	Code for the change in the quality of water after resettlement or compensation. If percentage remember to code in a way that we will know afterwards that was a percentage
Post water access	If access (distance, physical barriers, loss of equipment etc.) to water changed post resettlement and/or compensation	Increased Decreased Stayed the same	Code the change in water access. This can be a number, percentage or a sentence. If percentage remember to code in a way that we will know afterwards that was a percentage.
Post Health	How overall health status changed post resettlement and/or compensation. Includes mental health.	Increased Decreased Stayed the same	Code the change in health status. This can be a number, percentage or a sentence. if percentage remember to code in a way that we will know afterwards that was a percentage
Post health access	Whether the access to health services changed post resettlement and/or compensation	Increased Decreased Stayed the same	Code the change in health access. This can be a number, percentage or a sentence. if percentage remember to code in a way that we will know afterwards that was a percentage
Post House	If home types (construction) changed post resettlement and/or compensation	Yes No	Code the sentence describing a change in house construction. Please focus on household materials.
Post Livestock	If livestock species that people own changed after resettlement and/or compensation	Yes No	Code the sentence describing if the species that people own changed after the resettlement and compensation
Post livestock amount	Whether the amount of livestock that people own changed after resettlement and/or compensation	Increased Decreased Stayed the same	Code the change in livestock amount. This can be a number, percentage or a sentence. if percentage remember to code in a way that we will know afterwards that was a percentage
Post School	Whether the access to schools that people had changed after resettlement and/or compensation	Increased Decreased Stayed the same	Code the change in school access. This can be a number, percentage or a sentence. if percentage remember to code in a way that we will know afterwards that was a percentage

Table 4. (cont'd)

Post Sanitation	If the way people access to sanitation changed post resettlement and/or compensation	Increased Decreased Stayed the same	Code the sentence describing if there was a change in sanitation. Include solid waste, garbage, among others
Resettlement satisfaction	If resettled were satisfied with their post-resettlement life	Yes No	Code sentences portraying the satisfaction of resettlers
Sex differences	If resettlement or compensation effects differ among men and women	Men are more impacted than women Women are more impacted than men	Code sentences that portrays the differences among men and women regarding the effects of resettlement and or compensation.
Age differences	If resettlement or compensation effects differ among people of different ages	Yes No	Code sentences portraying the differences among people of different ages regarding the effects of resettlement and or compensation
Self-reported wellbeing	How the resettled and/or compensated feel about with wellbeing related to outlook (Author's definition of wellbeing, not ours. Could change paper by paper)	Increased Decreased Stayed the same	Code the change in self-reported wellbeing. This can be a number, percentage or a sentence. if percentage remember to code in a way that we will know afterwards that was a percentage
Compensation Household Right	Who has the right to receive the compensation?	Head of the household regardless of gender Head of the household if Male Other	Code the sentence that describes the actors that have right to compensation in households
Compensation undervalue	When compensation does not count for the right "value" of the assets	Yes No	Code sentences portraying under compensation of assets
Compensation disparity	If there was a difference in compensation depending on social and/or economic status	Yes No	Code sentences portraying differences in compensation depending on social or economic status
Compensation inconsistency	If they there was a difference in what local communities had before and what they actually got	More Less	Code sentences portraying differences in what people got and what had before. This can be also a number. but include sentences to be more explicit. It could be a value or perception
Compensation delay	If there was a difference between when compensation is promised and when people get it.	Yes No	Code sentences explaining compensation delay.

Table 4. (cont'd)

Compensation mismatch	If there was a difference in what was promised and what actually received	More Less Same	Code sentences describing the difference of what builders promised and what people got. this can be in percentages and numbers.
Compensation corruption	Subtraction of compensation money by officials, or others, before it reaches those rightfully entitled (Cernea, 2003)	Yes No	Code sentences portraying examples of corruption in compensation
Compensation cash mismanagement	Misdirection of compensation money by the recipients unaccustomed to handling cash (Cernea, 2003)	Yes No	Code sentences presenting a misuse of cash by recipients.
Compensation due to titles over Land	Just people with land titles were compensated.	Yes No	Code the sentence in case that compensation was only given to people with property rights over land.
Compensation sex	The authors mentioned that compensation differs based on sex	Yes No	Code sentence portraying differences in compensation to men, women.
Compensation age	The authors mentioned that compensation differs based on age	Yes No	Code the sentence presenting differences in compensation because of age
Compensation Ethnicity	The authors mentioned that compensation differs based on ethnicity. Indigenous groups are included	Yes No	Code the sentence presenting differences in compensation because of ethnicity
Compensation IK-Natural capital	Natural Capital (fish stocks, land owned, crops cultivated, etc. (Allison et al., 2006) compensation. Is expressed in terms of the object or service that is lost.	Land Trees Fish stocks Livestock Other	Code the sentence describing the compensation given to people. This might include numbers.
Compensation IK-Physical capital	Physical Capital (house) compensation. Is expressed in terms of the object or service that is loss. Any kind of real physical asset.	House Boats Motor Technology Agriculture inputs Other	Code the sentence describing the compensation given to people. This might include numbers.

Table 4. (cont'd)

Compensation IK-Human capital	Human Capital (people's capabilities in terms of their health, labor, education, knowledge, skills (Allison, et al., 2006) compensation. Is expressed in terms of the object or service that is lost. In this case education, training, and health services	Education Employment Training Other	Code the sentence describing the compensation given to people. This might include numbers.
Compensation out-kind	A type of compensation that provides different resources or services as the lost or damaged to the affected populations.	Cash Training House Technology Agriculture inputs Trees Fish stocks Livestock Land Other	Code the sentence describing the compensation given to people. This might include numbers. Code Out-kind compensation when the authors do not explain if assets were replaced by the same type of assets. If you cannot tell from the paper if it is a type of in-kind compensation, then use this out-kind code!
Compensation satisfaction	If people were satisfied with the compensation that they got	Yes No	Code the sentences portraying the satisfaction of people who was compensated
Compensation community	Compensation given to the community and/or municipality by the dam builders	Roads Access to energy Schools Health centers Other	Code the sentences that describe compensation given to the community and/or municipalities
Site type	The type of communities people were resettled into (sometimes communities are resettled intact, sometimes they are mixed with other old communities, or put into a new community that was already standing called a "host" community)	Intact Mixed with old communities Put into a host community Scattered throughout multiple types of sites Mixed and put into a host community	Code the sentences that better describes the type of communities that people were resettled into
Site neighbors	If resettled were able to continue living close to old neighbors	Yes No	Code the sentences describing if people is living close to their old neighbors
Official plan	If there is a government/company plan for how resettlement/compensation will work (also called Resettlement Action plan)	Yes No	Code the name of the plan, or the sentence describing that there was a plan for resettlement or compensation

Table 4. (cont'd)

Official theory	Was the resettlement/compensation plan/program inspired by other experiences (different places)	Yes No	Code the sentence describing if there was a theory guiding the plans of resettlement or compensation
Activism presence	If there is activism against dam construction or the resettlement/compensation process	Yes No	Code the sentence describing the presence or not of activism
Activism	How people protest dam construction and resettlement/compensation process. When there is an organization.	Protest Lawsuits Strikes Sit ins Other	Code the sentence describing the type of activism
Conflict	If authors mention that conflict was present between impacted population and dam builders/government during resettlement or compensation process. Conflict is understood here as a serious disagreement or argument.	Yes No	Code the sentences describing conflict
Coping and adaptation	If authors mention how individuals, households or communities are adapting or coping to the impacts generated by the dam	Yes: positive or negative No	Code the sentences that describe how people, households or communities are coping or adapting to the impacts generated by the dam. Code if the coping or adapting strategies are identified as positive or negative. If there is no mention of whether it is a positive or negative change, just code "yes" for the change.

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