

University of Nevada, Reno

Who Benefits from Hydropower in the 21st Century? Analyzing Local Benefit Sharing of Hydropower Projects in Nepal and Developing Countries.

A dissertation submitted in partial fulfillment of the
Requirements for the degree of Doctor of Philosophy in
Geography

by

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THE GRADUATE SCHOOL

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prepared under our supervision by

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Abstract

This dissertation addresses three significant research questions on hydropower dams and development geography. The first research question concerns the development of a new framework for evaluating hydropower benefit-sharing arrangements (HBSAs) across different countries of the Global South. Specifically, it argues that the present forms of HBSAs lack focus on spatial scales of development to fit within the broader dialogues of equity and rural development. The second research question deals with the experience of the Project Affected Communities (PACs) as stakeholders in the system of HBSAs in Nepal. Community leaders' experiences with and perspectives about local equity sharing (LES) and rural development in Nepal are the theme of the second research question. Results from semi-structured interviews with the chairpersons of the rural municipalities are used to investigate the impact of LES on the socio-economic condition of the local community. To my knowledge, it is one of the first studies to review the impacts of LES, which is a distinct form of HBSA that is confined to Nepal. The final research question concerns how LES has been evaluated by private hydropower developers in Nepal as they make decisions about domestic capital mobilization and mitigating conflicts. The work on these three research questions contributes to expanding our knowledge of HBSAs as it shapes rural development strategies across developing countries of the Global South.

This dissertation is dedicated to my late father and my beloved mother.

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PREFACE

This dissertation is aimed at researchers interested in a systematic review of hydropower benefit-sharing arrangements (HBSAs) practiced around the world, particularly in the developing countries of Global South. It will also be a useful resource to those who are interested in understanding the perceived impact of rural households' participation in Local Equity Share model of hydropower benefit sharing arrangement with respect to private hydropower projects. This study is also useful to researchers who are wanting to focus on the development aspect of water infrastructure. Part of this work is being prepared to be submitted to various geographic journals and seminars. Although the main ideas for all three chapters are mine, my advisor Dr. Kate Berry was involved very closely in the research for this dissertation.

For my research, I had initially identified twelve rural municipalities across three districts in Nepal for my field visit. My original plan was to travel to Nepal in summer of 2020 to conduct semi-structured interviews and focus group discussion with project-affected households across those selected rural municipalities in connection with research question 2. The research plan also included interviewing leaders from private hydropower project companies for research question 3. Unfortunately, the global pandemic of COVID-19 seriously hampered by plans to travel in 2020 and 2021. Amid the ongoing global health crisis and widespread travel disruptions, the political instability and deteriorating security situation in Nepal was another major determining factor that created challenges to physically travel. Thus, even though I had secured enough funds to support my field travel, I had had to revisit my research plan and methods as I was not able to travel because of these *force majeure* events. After consultation with my advisor and research committee, I revised my research methodology and interviewed the participants over the phone and zoom. I

switched interviewing individual households with rural municipality chairpersons because their information is public information.

The motivation to do this research came from my previous work experience in the field of small hydropower projects and rural development in Nepal. I have always been passionate about clean energy, environmental sustainability, and rural development. I pursued that passion while working for several years as a risk analyst and I handled a portfolio of more than a dozen hydropower projects. Hydropower forms the backbone for electricity generation system in Nepal, and this sector has witnessed a rapid transformation in recent years with construction of more private sector hydropower projects that also pose a challenge in the context of socio-environmental sustainability and climate change. I analyzed risk profile of privately funded small hydropower projects and examined whether they were technically viable, financially robust, and socioenvironmental sustainable. That gave me an opportunity to interact with project-affected communities and closely observe their role as stakeholders in such water infrastructure. I was impressed by the immense resilience demonstrated by project-affected rural households and at the same time intrigued by the impact of such water infrastructure on local economy. I therefore decided to pursue higher education in Geography, and I was motivated to write my dissertation in a topic involving hydropower projects and rural development.

Chapter 1. INTRODUCTION

Water infrastructure, such as hydropower projects, have played important role in influencing development of human civilizations (Hussey & Pittock, 2012; Worster, 1992). Hydropower projects have the ability to influence rural economy, and this topic has been critically analyzed (de Faria, Davis, Severnini, & Jaramillo, 2017a). In addition to directly influencing local economy, the hydropower dams also have the potential to impact local socio-economic in a way that is more inclusive, transparent, and sustainable. This is also highlighted in the 2030 United Nations Sustainable Development Goals (United Nations General Assembly, 2015). In making these connections, between April 1997 and 2001, the World Commission on Dams (WCD) was tasked to research large dams and their impacts on the environment and development globally. Ever since the WCD issued its significant report in 2000, discussions have ramped up about how to equitably share the benefits produced by hydropower dams in ways that are environmentally just and support sustainable development (Wang, 2012).

Development is a multifaceted and multidimensional concept. More quantitatively oriented practitioners and scholars often try to measure development through monetary values such as through gross domestic product, which has been widely used by economists and policy makers (Severnini, 2013). However, those in the qualitative camp argue that there are numerous aspects of development that cannot be comprehensively measured in dollar terms, but that does not make them any less relevant. For instance, the quality of life (Sharma, Guha-Khasnobis, & Raj Khanal, 2014), the freedom to make choices (Sen, 1999), or capacity to improve community values (United Nations General Assembly, 2015) each target the need to facilitate better livings and improve places for people. These represent a few of the more nuanced qualitative dimensions of development. Another important dimension of development addresses is who is covered: is this

just about our current generation and the amount of goods and services currently produced, or does development cover the future, including coming generations and natural resources that will be passed on? (Gerlitz et al., 2017). These qualitative aspects associated with development remain crucial to pursue. Such is the case researched here, where development issues associated with hydropower dams in the Global South remain significant in part because of the potential for irreversible damage to the environment and impacts on lives and livelihoods of rural households (Manorom, Baird, & Shoemaker, 2017; Severnini, 2013; Shoemaker & Robichaud, 2019).

Over time, public perceptions towards hydropower dams have fluctuated between good, bad, and downright evil (Ansar, Flyvbjerg, Budzier, & Lunn, 2014; Moore, Dore, & Gyawali, 2010). While some policymakers in Global South have often extolled hydropower dams as “temples of development,” there are also numerous instances where such infrastructure have created irreparable environmental and social damages. Then there are recorded cases of private investors harnessing this natural resource at the expense of human suffering (Ahlers, Budds, Joshi, Merme, & Zwarteveen, 2015a). The debate about hydropower dam construction is often highly polarized because of dams’ unique potential to complement the energy security on one hand and inflict adverse socio-ecological consequences on the other (Fearnside, 2015; Israel & Herrera, 2020; Martínez & Castillo, 2016; Sovacool & Walter, 2019). There is a general consensus that hydropower projects can contribute to the economic growth because they are often associated with the development of access roads and local infrastructure, employment generation, and a variety of ways to support local or national economies (Elfaki, Anwar, & Arintoko, 2020). At the same time, hydropower dams have also been criticized based on economic (Ansar et al., 2014), social (Tilt, Braun, & He, 2009), and environmental (Fearnside, 2005; Khagram, 2004) rationales. These criticisms culminated in the World Bank reducing its financing for such projects toward the end

of 20th century. (Dhaubanjari et al., 2021). However, in 21st century, the World Bank resumed its financing of the hydropower projects based on the justification that dams are effective tools in tackling both poverty and climate change (Shoemaker & Robichaud, 2019).

Other factors have changed the nature of hydropower development in the 21st century as well. Firstly, there were campaigns to re-brand hydropower as a “cleaner, greener and sustainable” source of energy (Ahlers et al., 2015a; Crow-Miller, Webber, & Molle, 2017). The argument that hydropower is the best alternative to fossil fuels has apparently gained traction post-Kyoto Protocol. Secondly, globalization has eased transfer of capital and technology among many developing countries across Asia, Africa, and Latin America (Freeman, 2017). And thirdly, many countries in Global South have initiated policy reforms to promote hydropower construction such as incorporating in its poverty reduction agenda or promoting more private capital in this sector. For example, the government of Laos declared a policy of leveraging hydropower resources to alleviate poverty in the country. More specifically, hydropower projects such as Nam Theun 2 project were hailed as model to remove poverty, although there are documented evidence of adverse social and environmental impacts (Manorom et al., 2017).

This last point is particularly important here – with increasing frequency, hydropower dams are being considered as conduits of economic growth from the perspective of rural development. Despite hydropower generation being viewed as a source to enhance rural development, the unevenness of benefits distribution between hydropower project investors and rural residents has led to friction and conflicts (Huber & Joshi, 2015). Those residents, households, and communities in rural areas who are impacted by the construction or operation of hydropower project are referred to as project-affected people (PAP) or project-affected communities (PACs). PAP and PACs typically live adjacent to the major hydraulic structures of the hydropower projects, such as access

roads, dam sites, penstock pipes, tunnels, powerhouses, switchyards, or transmission lines (ICIMOD, 2016). Where friction arises between the developers and PACs, this may hamper a project's construction or operation or can make it difficult for hydropower companies to raise sufficient capital to develop a project.

To redress the issue of the maldistribution of benefits, HSBAs were designed to transcend one-time compensation to PACs, per recommendations by WCD's 2000 report (Tahseen & Karney, 2017; Wang, 2012). HSBAs arose as a result of rights-based dialogue and participatory development following the recommendations of WCD 2000 (ICIMOD, 2016). Such intervention in hydropower sector was motivated by the three forms of environmental justice: distributive justice, recognition justice, and procedural justice (Jenkins, McCauley, Heffron, Stephan, & Rehner, 2016; Lee & Byrne, 2019). Different countries have developed or adopted different modes of HBSA and there has been constant search for a model that fits the developmental needs of rural regions in different countries. For example, the revenue sharing or royalty-based arrangement and development trust are popular models for HBSA, while Local Equity Sharing (LES) has become a mainstream approach in Nepal (Kouangpalath, Lebailly, & Ducourtieux, 2016; Shoemaker & Robichaud, 2019). LES refers to a provision which provides a least-cost pathway for PAP and PACs to buy common shares in the hydropower projects that is constructed in their area. Thus, LES was adopted as a refined version of HBSA to change the scale of inclusion and expand rural development in Nepal.

Although there have been many studies about the ecological impact of hydropower projects, there have been very few studies done on HSBAs in the context of rural development in countries in the Global South. For instance, Suhardiman et al., (2014) examined divergences between national and local priorities of dam construction and argued that the distribution of cost

and benefit was spatially unequal between rural and urban areas in Cambodia but their focus was not exactly on HBSAs. This research attempts to address that knowledge gap. Moreover, the study also tries to examine the perspectives of the community leaders of project-affected communities and the private hydropower investors with regard to participation and implementation of LES in Nepal.

1.1 RESEARCH OBJECTIVES AND QUESTIONS

To examine how HBSAs connect with rural development in the countries of Global South, this research asked: *Who Benefits from Hydropower in the 21st Century? Analyzing Local Benefit Sharing of Hydropower Projects in Nepal and Developing Countries*. HBSAs come in different iterations, and Nepal has been practicing a unique form of HBSA called Local Equity Sharing (LES) since 2010. By focusing on the HBSAs implemented in Nepal, I seek to understand how has the newly implemented LES version has shaped rural development of mountainous regions, in particular the socioeconomic outcome for local households and how LES has shaped hydropower project companies' capacity to raise domestic capital has been impacted by such policy interventions. The following research questions guided my study:

- (1) *First, how do hydropower benefit sharing arrangements contribute to different scales of development in the Global South?*
- (2) *Second, what have been community leaders' experiences and perspectives with LES and rural development in Nepal?*
- (3) *Third, what are the views of private hydropower investors with regard to LES, capital mobilization, and rural development?*

Literature on uneven distribution of impacts related to HBSA and unequal power relations in hydropower is sparse (C Schulz, Science, & 2022, n.d.; Christopher Schulz & Adams, 2019; Christopher Schulz & Skinner, 2022), but it is even more so in case of LES and private small hydropower projects. This dissertation combines three chapters in the context of hydropower development across countries in general and in Nepal in particular. This research involved semi-structured in-depth interviews with stakeholders namely, the community leaders (chairpersons of rural municipalities) as well as hydropower project developers. The methods used for human-subjects research throughout this dissertation research were approved by the University Institutional Review Board [project # 1682850-1; dated June 6, 2021]. Other relevant documents were also relied on.

1.2 BROADER SIGNIFICANCE

Despite many controversies towards the end of 20th century, hydroelectricity generation has flourished and continues to be a major source of electricity for numerous developing countries, including Nepal (Liu, Liu, Wang, & Kremere, 2019; World Energy Council, 2020). Against this backdrop, the construction of private small-scale hydropower projects has also accelerated, perhaps based on the argument that such projects are more sustainable than their bigger counterparts. Finding a development pathway while mitigating negative environmental impacts and promoting social benefits has been the premise of many small hydropower projects and has also influenced the ways that HSBAs are structured.

1.3 DISSERTATION FORMAT

This dissertation consists of three main chapters that investigate closely related topics in HBSA and rural development that help advance development geography perspectives.

After this initial chapter, the second chapter, titled “*How do hydropower benefit-sharing arrangement contribute to different scales of development in global south?*” reviews information about existing HBSAs in developing a new framework of hydropower benefit sharing. While HBSA may have the potential to contribute towards poverty reduction and rural development, selecting the best fit HBSA, its effective implementation, and social inclusion are some of the challenges to overcome. By doing a systematic review of relevant literature and critically examining several HBSA approaches across different countries, I examine how different forms of HBSA designs are implemented across different countries of the Global South and their connection with distribution of impacts, and socioeconomic partnerships with local communities. By proposing a new HBSA-Development Framework this chapter offers a knowledge base of existing HBSA tools and approaches and works to advance the debate on HBSA led rural development.

The third chapter, titled “*Community leaders’ experiences and perspectives about Local Equity Sharing and local development in Nepal,*” explores the impact of LES upon socioeconomic conditions of rural households and rural development in Nepal. These impacts are significant because they are related to the achievement of the two critical objectives of recommendations in the WCD 2000. I examine the implementation of LES in Nepal and their bottlenecks through the lens of community leaders in the rural hilly areas where such policy interventions were implemented. By undertaking semi-structured interviews of 28 chairpersons of rural municipalities across Nepal, I investigate the experiences and perceptions of community leaders with LES and what they know of their rural constituencies’ experiences and perceptions. I am interested to identify if they have been successful in meeting their originally stated objectives and about any lessons they have learned that would be useful for future policy refinement.

The fourth chapter titled “*Experiences and perspectives about local equity sharing within Nepal’s private hydropower sector*” is also concerned with the implications of LES, this time for the private investors of small-hydropower projects in Nepal. The attention is on the change in capacity of private developers to mobilize domestic capital within Nepal and the changed dynamics to foster better relationship with local communities by winning social acceptance for their projects. I examine the implementation of LES in Nepal and its impact on domestic capital mobilization and social acceptance through the lens of private investors in mountainous regions where such policy interventions were implemented. By undertaking semi-structured interviews of 30 directors and executives of private hydropower projects in Nepal, I investigate the experiences of private sector in evaluating to what extent has LES increased the capacity of private entrepreneurs to raise more equity locally and cultivate better relations with local community thereby transforming the landscape of hydropower development in Nepal.

1.4 CONTRIBUTION OF THE DISSERTATION

This dissertation emphasizes the ways in which policy interventions in hydropower sector have different implications depending on the scale of geography. The three main chapters contribute insights about the importance of scales of participation for different stakeholders in recreating alternative rural economies in Global South where hydropower project construction has gained momentum. The first chapter contributes to better understandings about HBSAs’ contribution to development by providing a framework that focuses on issues of environmental justice and sustainable development as they change by HBSA and geography. The second and third chapters address the impact of participation in HBSAs, particularly the Local Equity Share arrangement, from the perspectives of different stakeholders, namely rural project-affected communities and households and national hydropower developers. This contributes to better

understandings about the different channels by which the participation of project-affected households and private hydropower investors in the Local Equity Share (LES) type of HBSA alter rural development landscapes in Nepal and transform the economic development options for rural communities and households.

Chapter 2. HOW DO HYDROPOWER BENEFIT SHARING ARRANGEMENTS CONTRIBUTE TO DIFFERENT SCALES OF DEVELOPMENT IN GLOBAL SOUTH?

2.1 INTRODUCTION

Hydropower projects have been around since 19th century as a source of electricity, and hydroelectricity forms an integral part of energy mix in numerous countries. Viewed from economic perspective, hydropower projects are resource extraction activities that lead to accrual of monetary and non-monetary benefits, but their development has also been scrutinized when viewed from the perspective of environmental justice framework, viz. on the grounds of uneven distribution of benefits, unfair procedural regulation, and inadequate participation of rural residents (Hess, Costa Ribeiro, & Wieprecht, 2016). An important critique of hydropower development is that excessive focus on economic returns can lead to undermining the commons, such as the Tarbela and Mangala Hydropower projects in Pakistan where the construction of hydropower projects ended up aggravating the impoverishment of PACs in rural areas because of the limitations of one-time compensation and the lack of attention to livelihood diversification and resettlement (Yuefang, Ali, & Bilal, 2021).

In response, HBSAs were created, which Skinner (2015) describes as “sharing a portion of the economic rent that investments in hydropower generate”. The concept of HBSAs was developed to manage hydropower projects in ways that would allow project-affected communities (PACs) to participate in a more equitable form of cost-benefit sharing (Wang, 2012), while providing practical pathways to “join many strands of water governance reform and sustainable

thinking under the IWRM framework” (Haas, 2009, p. 5). HBSAs go beyond the notion of benefitting only few individual households but rather encompass an inclusive benefit-sharing program that benefit the entire community and brings transparency. HBSAs have evolved from the concept of a one-time compensation to displaced people that originated in 1950s to other approaches designed to increase long-term support and promote partnership in the 21st century (Cernea, 2008; Skinner, Krauss, & Newborne, 2014). HBSAs differ from traditional one-time compensation mechanism in three distinct ways. First, their area of coverage transcends the region of directly affected households who are physically displaced; secondly, unlike the compensation mechanism, the expense related to HBSAs are not front-loaded in project cost but instead sourced from future cashflows; and thirdly, HBSAs are aimed at promoting local development rather than just replacing for lost assets as was the case with compensation mechanism. Similar working arrangements are sometimes found in other extractive industries, such as mining and petroleum, where revenue funds aim to improve public services and enhance rural development (Petrov & Tysiachniouk, 2019). Just like in those industries, finding a right mechanism to transfer the benefits to PACs is not only crucial but also challenging.

The Brundtland Report first defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Keeble, 1988, p. 41). This definition focused on three key pillars: economic development, social development, and environmental protection for future generations. This idea was also echoed by Amartya Sen who argued that development is “the establishment of conditions and institutions that foster the realization of the potential of the capacities and faculties of the human mind in people, communities and, in turn, in places” (Sen, 1999). Thus, Sen equated development with socioeconomic wellbeing centering around inclusive growth, whereby all individuals in a

society have equal opportunities to participate in economic empowerment and social mobility. To an extent, these concepts are embedded within Sustainable Development Goals 2030 that aim to address the global challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice (Sultana & Loftus, 2012). Close attention to the design of HBSAs may present different opportunities to enhance rural development while also remaining attentive to procedural fairness in ways that ensure that hydropower development is compatible with tenets of environmental justice.

In this chapter, the focus is on development that encompasses “the process of improving the quality of life and economic well-being of people living in rural areas, often relatively isolated and sparsely populated areas” (Moseley, 2003, p. 5). Such development is designed to contribute to local economies and communities by finding ways to enhance the wellbeing and quality of life of people living in a geographical region (Pike, Rodríguez-Pose, & Tomaney, 2007). Unlike the classical approach to economic growth, where the focus is primarily on market productivity and GDP expansion, perspectives that embrace environmental justice orientations and rural development draw attention to assessing socioeconomic and environmental well-being of the local populations, which may include such things as access to improved water, better education, better housing, and health facilities (Macekura, 2018; Sen, 1999). Furthermore, development in the rural context can be misunderstood if many rural areas are lumped into a single demography because communities and even households frequently have important differences from one another. Approaches to rural development in the Global South that consider the various ways that HBSAs may influence the socio-spatial and environmental prospects for rural areas remains an understudied area that is addressed in this chapter.

While numerous studies have previously tried to connect hydropower project construction with sustainable development, the goal here is to focus on HBSAs in the Global South with respect to environmental justice considerations and spatial differentiation. I present a framework designed to be used in assessing the potential impacts of HBSAs at various spatial levels, with the intentional inclusion of rural households. The next section addresses the importance of recognizing spatial differentiation and environmental (in)justice considerations in HBSAs. I introduce the HBSA system and this is followed by a summary of the critiques of HBSAs. The HBSA framework is introduced and how it can be used to evaluate various types of HBSAs with respect to their approach to development and environmental justice at the national, local, and household levels.

2.2 SPATIAL AND ENVIRONMENTAL JUSTICE CONSIDERATIONS IN HBSAS

Many studies of local and regional effects of natural resource extraction characterize natural resource wealth as a curse because of inequitable distribution of benefits and costs (Aragón & Rud, 2013). In case of hydropower, many developing countries depend on it to improve energy access, but at the same time it can aggravate social and environmental justice problems. In case of hydropower projects, construction in Global South countries is often accompanied by rhetoric that the economic benefits will automatically trickle down to the individual members of PACs (Ahlers et al., 2015). However, recent studies have shown that the distribution of the benefits and burdens of hydropower development varies spatially and temporally (Duflo & Pande, 2007). For instance, the negative impact of dam construction, such as socio-environmental costs, tend to be "sticky" at the local level while the major benefits from dams, such as electricity and profits, are destined for faraway urban centers (MottMcDonald, 2009). Also, when royalties and taxes from hydropower projects are collected at the federal or state level, PACs and rural households may receive no

benefits or they may have to wait to experience a few benefits (Balasubramanya, Giordano, Wichelns, & Sherpa, 2014).

Several studies indicate that top-down approaches can result in spatial inequities in the distribution of benefits from hydropower projects. For example, in one study from Brazil, Faria et al. (2017) found there was no statistical difference in the economic performance between counties which hosted hydropower projects and those that did not (de Faria, Davis, Severnini, & Jaramillo, 2017b). Another study from North Vietnam found that average poverty rates in the remote, mountainous regions hosting dam projects were as high as 70% even after years of the completion of hydropower projects (L. J. Haas & Dang Vu Tung, 2007). Likewise, Duflo & Pande (2007) argued that upper riparian villages suffered from low agricultural production and increased poverty rates after the construction of dams (Duflo & Pande, 2007). Research in the Red River basin, China found that cascade-based run-of-river small hydropower projects (SHPs) fragmented river-flow and drastically reduced water availability during dry season, which led to adverse socioeconomic impacts upon the rural communities (Harlan et al., 2021). Moreover, even within the spatial confines of PACs, not all households appear to be benefitting equally from hydropower development. For instance, a study in Yunnan Province, China found that the already well-off households were more likely to benefit from hydropower project construction than others in the rural areas (Ptak, 2019). Yet numerous countries in Global South continue to see HBSAs as potential conduits for rural development and poverty eradication (Hartmann, 2019; Shoemaker & Robichaud, 2019). Lord (2016) reflects this perspective in arguing that the political dimensions of water and socioeconomic development systems are crucial to accomplish the prosperity and dreams of the “citizens of hydropower.”

This study seeks to better understand differences between HBSAs that are currently used throughout the Global South. Through examining the linkages between HBSAs and rural development, this study develops a framework that evaluates equity considerations and differentiates spatially between different types of HBSAs. Particular attention is paid to the household scale. The study contributes towards better understandings about how hydropower development influences rural development in the Global South when HBSAs are used.

2.3 HBSA SYSTEM

The HBSA system is comprised of relationships, procedures, and actions of various types of HBSAs that are aimed at impacting a region, community, or households. The concepts of local development and economic empowerment of local communities are deeply rooted in the different renditions of HBSA that are discussed in this chapter. HBSA systems present a complex set of relationship among guiding principles, mode of HBSAs, types of HBSAs, and spatial target (Petrov & Tysiachniouk, 2019).

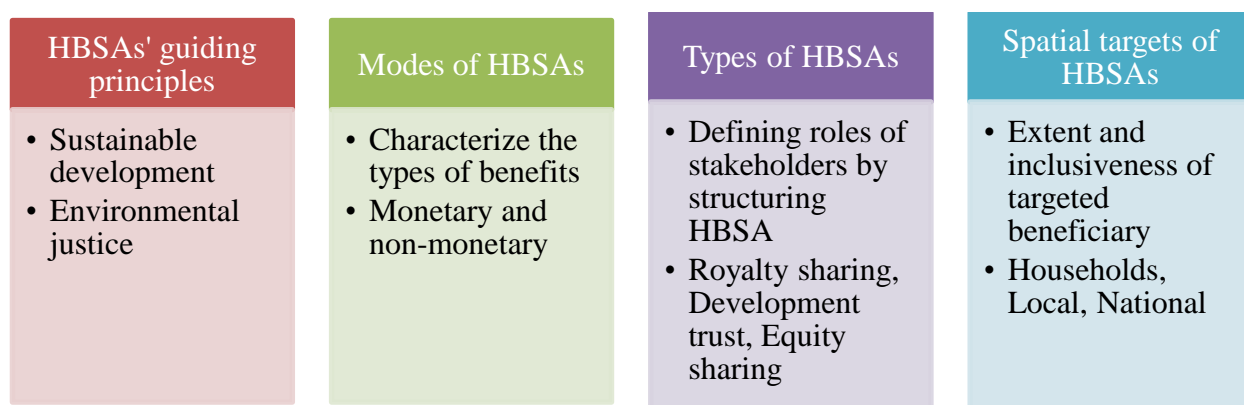


Figure 1: HBSA system (adapted from Petrov & Tysiachiniouk (2019))

2.3.1 *Guiding Principles of HBSAs:*

Environmental justice, rural development, and sustainable development form three guiding principles of HBSAs that recognize “equitable distribution of environmental risks and benefits, and meaningful involvement of all stakeholders in planning of environmental projects” (Schlosberg, 2007, p. 4). Environmental justice can be seen as having three aspects: distributional justice, recognition justice, and procedural justice. Distributional justice refers to equitable distribution of benefits and burden without exclusion of social groups (Khagram, 2004). Major hydropower projects around the world exhibited a significant imbalance in distributional justice because the direct hydropower benefits (primarily, electricity) are largely transmitted to distant urban centers, while the adverse impacts or costs typically remain in rural areas within PACs (Hess et al., 2016). Recognition justice refers to an appreciation of special socioeconomic conditions and different kinds of knowledge of PACs. Many major hydropower projects have fared poorly on the grounds of recognizing the specific needs of PACs in rural development and environmental sustainability, which can vary within and between rural communities (Schlosberg, 2007, p. 26). HBSAs can take into account that the hydropower project company ought to acknowledge this unevenness and work for inclusive benefits. Procedural justice refers to how projects are implemented. An example of procedural justice related to HBSAs is from the WCD 2000 Report’s recommendation to eliminate the classic one-time compensation to PAP in favor of long-term recurring compensation (Hartmann, 2019).

In terms of integrating principles of rural development and sustainable development, an example is from the International Finance Corporation, who in 2003 recognized the importance of the social aspects of investment for sustainable economic development, and has since aligned its hydropower financing guidelines accordingly (IFC, 2003, p. 3). The central idea of both rural and

sustainable development is to harness natural resources while fostering relationships based on mutual trust and respect that has been lacking in most hydropower project development (Dixit & Gyawali, 2010; Shoemaker & Robichaud, 2019). Different types of HBSAs strive for better socioeconomic outcomes for rural communities that may enable households to make their own decisions around health, education, employment, and seek better opportunities to improve the quality of their lives, especially since rural areas in developing countries suffer from vulnerability of marginal groups, such as women and Indigenous communities. Accordingly, some forms of HBSA require hydropower projects to recognize the rights of PACs, engaging different stakeholders during project implementation, and offering non-monetary approaches that in some instances are more effective in engaging with and supporting the socioeconomic development of some rural communities (Paiement, 2013).

2.3.2 *Modes of HBSAs:*

Modes of HBSAs characterize the types of benefits delivered through an HBSA. Ideally constructive dialogue and frequent interactions between hydropower developers, government agencies, and rural communities can identify the mode that is most likely to achieve mutually agreed upon objectives of benefit sharing. Previous studies have broadly classified such modes into monetary, non-monetary, and community service. Each of these modes may have their own specific sub-divisions, which result in various types of HBSAs. Within the mode of monetary HBSAs, for example, there can be different types of HBSAs, which include, establishing preferential rates for electricity in India (Wang, 2012), revenue sharing for funding the rural development budget of PACs in Brazil, Colombia, Nepal (L. J. Haas & Dang Vu Tung, 2007), and funding a community development fund or a rural development fund in Sierra Leone, India, Mali,

Chile (MRC, 2011). HBSAs provide several pathways for division of royalties, taxation and revenue sharing among national, state, and local governments.

2.3.3 *Types of HBSAs*

The types of HBSA refer to a specific structure utilized to deliver the intended benefits. There is no one size fits all and one country may embrace several types of HBSA. In determining the type of HBSA it is necessary to recognize and define the roles of stakeholders with respect to one another, including hydropower developers, government agencies, and rural communities. In achieving the objectives of benefit sharing. For example, some HBSAs rely on the national government to play a leading role. If a national government agency collects royalties or some form of tax from the hydropower companies and then distributing these to PACs this would be a royalty sharing HBSA (Balasubramanya et al., 2014). Likewise, in China and Chile transfer payments are made that involve equity sharing with municipalities (MottMcDonald, 2009), which is another type of HBSA that redistributes social goods in different ways (Balasubramanya et al., 2014; ICIMOD, 2016). As such, the variety of types of HBSAs present a diverse suite of opportunities, rather than presenting a single measure for inclusive development of a rural geographic region because there is “no [universal] blueprint that can be used to determine what equitable sharing looks like” (IFC, 2018, p. 19).

When taken together, the guiding principles, modes, and types HBSAs allow for flexibility in structuring customized approaches that projects, or countries can match with their developmental path. In fact, it is not uncommon for projects in a country to implement two or more different types of HBSAs. For example, in Panama the Bayano hydropower project has adopted a mixed approach of monetary and non-monetary measures, including municipal taxation, a development fund, capacity building program for PAP and land rights program for PAP. Another

project, the Bonyic hydropower project, has adopted only non-monetary modes of HBSA, such as capacity building, preferential hiring, and community infrastructure (Paiement, 2013). In the case of Sierra Leone, the Bumbuna hydro project has adopted a revenue sharing model that builds the Bumbuna development trust, which invests in capacity building, infrastructure, resource rights, and environmental mitigation (Wang, 2012). On the other hand, Urura-1 hydropower project doesn't have non-monetary HBSA modes, except for the environmental management, however it collects resources from the project via municipal taxes, revenue sharing, and development trust (MRC, 2011).

2.3.4 *Critiques of HBSAs*

Twenty years on after the formal introduction of HBSAs by WCD 2000, the effectiveness of HBSAs is still debated (Christopher Schulz & Adams, 2019). Majority of western countries have already endorsed and adopted the idea of HBSAs, however major countries such as China, India, and Brazil have not, thereby left out big audiences originally intended for such policy. These countries claim they have their own benefit sharing arrangements in place that are robust enough. For instance, Brazil argued that it has a resource use tax provision (Brazil National Constitution, 1988) to collect revenue as a fee for water used to generate electricity. This fee is then distributed among the federal government, local municipalities, and state/ provincial authorities in the proportions of 10%, 45%, 45% respectively (MottMcDonald, 2009), which aligns with the recommendations in the WCD 2000 Report. As such, many scholars argue that Brazil already had such benefit-sharing provisions in place even before these provisions were rolled out after WCD 2000 (Cernea, 2008; Christopher Schulz & Skinner, 2022).

HBSAs are principally designed to alter the allocation of costs and benefits that encompasses sharing of monetary and non-monetary resources generated by a hydropower during

its lifetime. While HBSAs may help increase the pool of resources and level of awareness among different stakeholders of a hydropower project and address rural development, the system has been criticized for inadequacies in the design and implementation. This has led to calls to reform the existing benefit sharing policies (Cernea, 2008). Such critiques include: the inability to effectively implement monetary modes of HBSA in some countries in the Global South, the need for more clarification on non-monetary modes of HBSA, and the paucity of monitoring and evaluation of the performance of HBSAs (Balasubramanya et al., 2014).

Existing HBSA models seem to have a strong focus on monetary benefit sharing approaches, with the availability of clearly laid out approaches to transfer monetary benefits, such as municipal equity, municipal taxes, or royalty sharing in a hydropower project (Bhagabati, Kawasaki, Babel, Rogers, & Ninsawat, 2014; ICIMOD, 2016; IFC, 2018; Christopher Schulz & Skinner, 2022). Such schemes tend to work efficiently in a developed country setting such as Norway (MottMcDonald, 2009), where the laws are clearly laid out, transparency and accountability are respected, and the benefit-transfer system gets strong support from other governing institutions. For example, legislation for monetary benefit sharing is often regarded as an enabler or necessary precondition. Unfortunately, in case of many countries in the Global South, political systems and governance are not robust enough to implement HBSAs as designed. This compromises effective implementation of monetary modes of HBSA.

HBSAs rightly incorporate non-monetary modes to address rural development, however the issue with non-monetary benefits is quantification of the impacts. Unlike the monetary benefits modes, the impact of non-monetary benefits cannot be easily quantified, and in many cases the benefits may not be immediate or direct. For instance, initiatives such as capacity building, replacement of trees cut down by the project, or improvement in navigation systems may bring

benefits to PACs (MottMcDonald, 2009, p. 37), however, accurately quantifying their impact is challenging. Moreover, many of these benefits may be classified at the national level, but then the mechanisms for transferring non-monetary benefits to rural development are not straightforward.

The final critique is that many types of HBSAs focus on benefit sharing at the scale of the province, district, or municipality level (or higher level) and expect that local level benefits will eventually trickle down to individual households in a community. However, it has not been studied about whether individual households experienced the benefits of HBSA schemes. For instance, a study undertaken in Nu River Valley in China (Ptak, 2019) concluded that more resourceful households of a municipality generally tend to benefit more from hydropower benefit transfer programs because of their better access to information, connection, and finances, while the less-fortunate households continued to languish despite the community-level benefit sharing arrangements. Therefore, there is a room to think through the spatial arrangements to refine HBSAs in ways that facilitate individual households in receiving benefits from hydropower projects.

2.4 HBSA FRAMEWORK

The final critique in the previous section reinforces the significance of the fourth aspect of the HBSA system outlined in Figure 2 – the spatial arrangement of HBSAs. Hydropower projects have the potential to support rural development through groups of actors and partnerships forged at different spatial levels (Tortajada, 2015). However, these same arrangements can lead to imbalances and spatially uneven development. As a result, when considering HBSA it is important to consider how spatial arrangements are structured in ways that facilitate making resources more available and effective for PACs. While it seems that few HBSAs are oriented so that the direct

beneficiaries are PACs or individual households, recognizing spatial arrangements can highlight the importance of approach focused on the end-beneficiaries.

In this section, a framework on HBSA is presented in Table 1 below highlights various spatial targets and underscores important issues of environmental justice, rural development, and sustainable development. This framework is designed to aid with HBSA selection for hydropower projects in countries within the Global South.

Table 1: HBSA-Development framework

	HBSA Type	Spatial Targets of HBSA		
		<i>National</i>	<i>Local</i>	<i>Household</i>
Monetary HBSA	Subsidized Electricity	Is it feasible for the project to supplement national grid but prioritize electricity for urban & industrial centers and reduce the cost of electricity? <i>Does this help secure reliable power supply for urban and industrial centers?</i>	Is it feasible for the project to supplement local electricity grid and subsidize the cost of electricity in the local area? <i>Does it help ensure reliable power supply for local towns?</i>	Is it feasible for the project to support electrification of individual households in the project region? <i>Does it support rural households and rural businesses?</i>
	Development Trust/ Fund	Is it feasible for the project to contribute to a national development trust? <i>Is the project contribution going to support development projects of national scale?</i>	Is it feasible for the project to setup a local development trust? <i>Is the project contribution centered on benefitting greater population of local area?</i>	Is it feasible for the project to assist local households in a development trust? <i>Is the project contribution limited to benefit the project-affected households?</i>
	Revenue sharing	Is it feasible for the project to distribute revenue nationally? <i>Is the project contribution going to development projects that benefit the entire population?</i>	Is it feasible for the project to disburse revenue to local administrations? <i>Is the project contribution centered on benefitting greater population of local area?</i>	Is it feasible for the project to disburse revenue with local households? <i>Is the project contribution limited to benefit the project affected households?</i>
	Equity Sharing	Is it feasible for the national government to have a share of equity in the project? <i>Is future financial return going to development projects that benefit the entire population?</i>	Is it feasible for the local administration to have a share of equity in the project? <i>Do the funds help finance local development projects?</i>	Is it feasible for the households to have a share of direct equity in the project? <i>Do the funds support financial improvements for project-affected households?</i>
Non-monetary	Environmental mitigation	Is it feasible for the environmental-mitigation efforts to be executed/monitored at national level? <i>What type of environmental mitigation and outcomes are targeted at the national level?</i>	Is it feasible for the environmental mitigation efforts to be executed/monitored at local level? <i>What type of environmental mitigation</i>	Is it feasible for the environmental mitigation efforts to be executed/monitored at the household level? <i>What type of environmental mitigation and outcomes are</i>

		<i>and outcomes are targeted at the local level?</i>	<i>targeted at the household level?</i>
Community support activities	Is it feasible for the project to support capacity building, preferential hiring, and infrastructure at national scale? <i>What types of development outcomes are targeted at the national level?</i>	Is it feasible for the project to support capacity building, preferential hiring, and infrastructure at state level? <i>What type of development outcomes are targeted at the local level?</i>	Is it feasible for the project to support capacity building, preferential hiring, and infrastructure at household level? <i>What type of development outcomes are targeted at the household level?</i>

*National government refers to the federal or central government; local government refers to the district or county level government.

*Subsidized electricity refers to electricity supply at discounted prices to the local households, regional or national grid.

*Revenue sharing refers to the sharing of royalties and fees raised by the national government with the local administration.

*Development trust refers to a Trust Fund set up to tap certain percentages of revenue from the project for supporting community welfare activities such as education, health, drinking water, etcetera of the rural households.

*Equity sharing provision refers to an arrangement whereby the hydropower project welcomes equity participation of the national government, local administration, or the rural households. This entitles the participating entity to a share in profit.

*Environmental mitigation refers to the initiatives to counter the damage to forests, land and aquatic life, etc.

*Community support activities include livelihood training opportunities and welfare activities to help the community.

This table displays various modes and many common types of HBSAs along the vertical axis. It also illustrates three different spatial targets of beneficiaries along the horizontal axis, namely at national, local, and household levels. Numerous countries have chosen to implement HBSA on a national scale. The three distinct spatial levels were motivated by previous section where it was inferred that while the ultimate target is for the These may be more centrally planned economies, for example, China where funds from all hydropower projects are collected at the rate of 0.08 cents per kwh on electricity tariff across the country (Xia et al., 2018). The fee is eventually distributed to finance regulatory functions, land compensation or passed on to the state/provincial authorities hosting the project. This type of HBSA may fit into the first column that pertains to National level HBSA. Other countries or projects may target making resources available to a province or municipality through a royalty-sharing or municipality equity sharing arrangement. For instance, in Brazil and Colombia, royalty distribution between the state and local governments is done, while in projects like Bumbuna Hydroelectric project in Sierra Leone and Mphanda Nkuwa Hydropower project in Mozambique, HBSAs are implemented at the local level

(Dombrowsky et al., 2014). In Sierra Leone, for instance, a development trust is set up as separate legal entity, with the board of trustees represented by national and local government, traditional leaders, civil society, and the private sector (Wichelns, 2014). And finally, some HBSAs are designed for beneficiaries at the smallest spatial scale, households. If the aim is to achieve benefit-transfer directly at household level then such distributions make sense, for instance LES which is practiced in Nepal (ICIMOD, 2016).

Within each cell of HBSA-Development Framework are two questions intended to be addressed on a case-by-case basis as the particulars of a country or project are considered. The upper question is designed to raise issues about the feasibility of the HBSA to operate at that spatial level. The lower question in each cell (which is shown in italics) raises issues about environmental justice, rural development, and sustainable development that may be relevant for that HBSA at that particular spatial scale. The intent is for responses to these questions to provide guidance in making decisions about HBSAs as the feasibility of various options are outlined and more focus is drawn to structuring spatial arrangements to best effectuate development.

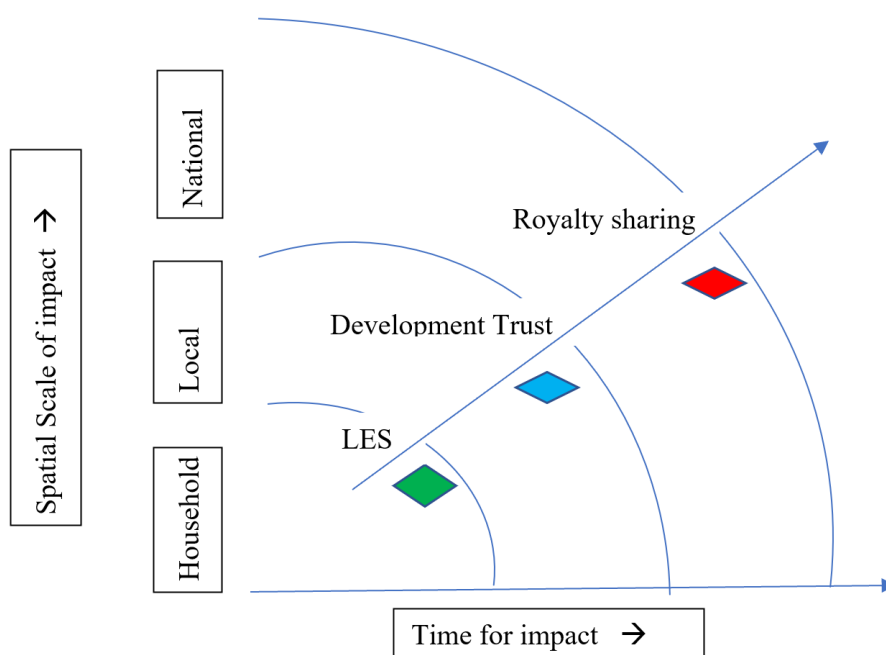


Figure 2: Illustrating Spatial Scales and Time to Impact for 3 types of HBSAs

The above diagram illustrates how space and time are built into three types of HBSAs. In the highest spatial level of HBSA such as a royalty sharing arrangement, revenue may be collected directly at the national level by relevant government agencies as we have highlighted in examples above. This revenue is then allocated to development activities or welfare projects at a national scale, and accordingly the time for an impact is likely to be highest in this type of approach because of involvement of multiple government agencies at the highest level that could lead to some lag. But more importantly, funds raised are typically split between the federal government and the districts or provinces, which already reduces the impact of investment in local region. Moreover, if the funds are to be invested in a development project of national or regional importance, such as roads, airports, bridges, water supply system or health and education facilities, there is likely to be a significant time-lag due to the need for necessary approvals and budgeting. Local administration

or the PACs have no active role in the process as the decisions would be made at the highest levels at the national or regional level government agencies. A part of the funds thus collected could be shared with the local districts or administration to fund their budget (Huber & Joshi, 2015; Yuefang et al., 2021). However, there could be a lag in implementation of the development projects and their eventual impact on the PACs because the federal or state agencies arguably will have to follow established guidelines for disbursement, implementation, and monitoring.

In the middle spatial level of HBSA such as a local development trust, the funds received from the hydropower projects are channelized into a community trust which is then utilized to promote capacity building of the community through a combination of measures such as employment generation, environment protection, poverty reduction, and rural electrification. Under this arrangement, a portion of the hydropower project's revenue is tapped into the local development trust, which is overseen by a group comprised of representatives from the national government, regional administration, and representatives from PACs e.g., Lesotho fund for Community Development, Bumbuna Watershed Management Agency, and Bumbuna Conservation Authority (Wang, 2012). The time for implementation of development projects such as a drinking water supply for local community would be faster to execute since the funds are available at the local level and the decision-making body is also comprised of the representative from PACs. Hence, the impact on PACs would likely be shorter than that in case of royalty sharing, however, there are still some time-lag because the development trust has to follow through a set of fixed procedure while allocating its welfare funds (Lebel et al., 2014). However, lack of clarity in institutional procedure and transparency issues to manage funds could be some bottlenecks for local development trusts (Yuefang et al., 2021).

Finally, at the lowest spatial level of HBSA, there could be an arrangement, whereby every household is individually participating in the arrangement. This form of HBSA would be administered at the lowest level and would require some direct form of channel between PAC household and the project company. It is also characterized by minimal government oversight or involvement of public agencies. One such case is Local Equity Share (LES) form of HBSA, whereby PAC households have an opportunity to be direct participants in the benefit-burden re-distribution process. In terms of time, this arrangement could see immediate impact since the transfer of funds is directly made without any bureaucratic hurdles, e.g. Nepal (IFC, 2018).

2.5 CONCLUSION

“At the heart of the dam debate are issues of equity, governance, justice, and power”
(WCD, 2000, p. 27)

This chapter looks closely at HBSAs and presents a framework for considering the linkages between hydropower projects and development as articulated through HBSAs. Examples from studies across Asia, Africa, and Latin America demonstrate situations associated with HBSAs in countries within the Global South. Hydropower-led development can be a non-linear, multi-dimensional, and multi-scalar complex puzzle, which is arguably of special significance in rural places within these countries. Moreover, current HBSAs are not always sufficiently integrated with other critical features, such as political and governance frameworks and monitoring and evaluation. While the HBSAs operating at national level such as Royalty sharing approach tend to envision the ‘trickle-down’ effect from a macro perspective (Balasubramanya et al., 2014), the community level HBSAs such as Development Trust are sadly also not as active and successful as expected because of the lack of established rules and good leadership and leadership as seen across numerous projects in Pakistan (Niesslein, 2019). Therefore, there is a room to think through the

spatial arrangements to refine HBSAs in ways that facilitate individual households in receiving benefits from hydropower projects.

The intent for this chapter is to contribute by expanding the base of knowledge about the HBSA-development nexus. I pay particular attention to the spatial arrangements of HBSA; time to impact of development, and issues of environmental justice, rural development, and sustainable development that are central to HBSA. I have introduced a framework that is designed to be used in evaluating between different modes and types of HBSAs. A series of questions about feasibility and development are incorporated within the framework to prompt thinking and decision-making about HBSAs. The framework is organized spatially to facilitate addressing the important issues surrounding spatial arrangements in HBSAs. Separately, a diagram about the relationship between spatial arrangements and time to impact is provided to compare between three types of HBSAs. In addition to improving our understanding of the relationship between hydropower and development, this research may also be useful in streamlining typologies of HBSAs.

While revealing some of the characteristics and challenges associated with HBSAs, I have not identified an ideal HBSA regime for the countries of Global South. In fact, the diversity of HBSAs offers a variety of options for projects or countries, as no one size fits all. This is not to suggest that HBSA are fixed because there is ample room for improvement in each type of HBSA. Sustainable development and HBSA both have a common aim to improve wellbeing, health, and security of the project-affected communities. Viewed that way, HBSA may serve as a tool or bridge between hydropower projects and sustainable development.

Chapter 3. COMMUNITY LEADERS' EXPERIENCES AND PERSPECTIVES ABOUT LOCAL EQUITY SHARING AND RURAL DEVELOPMENT IN NEPAL

3.1 INTRODUCTION

Hydropower Benefit-sharing Arrangements (HBSAs) were designed to reconcile some of the economic, social, and environmental problems associated with hydropower dams (Wang, 2012, p. 6). HBSAs are much broader in scope than one-time compensation to displaced people because they are intended to promote long-term development of PACs by providing a mix of monetary and non-monetary benefits. As hydropower dam construction gathered pace towards the end of the 20th century, the chasm between the dam developers and civil societies also grew on the question of ecological impacts and benefit-cost sharing with project-affected people (PAP) (Fearnside, 2015; Khagram, 2004). HBSA is “distinct from one-time compensation payments due to its ongoing nature and distinct from resettlement support due to being unrelated to the mitigation of project impacts” (IHA, 2018, p. 65). Different countries have adopted different HBSAs following the WCD 2000 recommendations. One such arrangement is royalty sharing, whereby a certain percentage of revenue is deducted from the hydropower project company’s revenues to be used to fund the national development activities. Another type of HBSA is a development fund, whereby a development fund or trust is created at the local level for the welfare activities of PAC.

Nepal has also adopted a mix of HBSAs, but it has also institutionalized a distinct form of HBSA since 2010. This is called Local Equity Share (LES) and it offers the PAP an opportunity to own shares in a hydropower project that is built in their rural municipality (ICIMOD, 2016; IFC, 2018). Companies can issue up to 10 percent of shares to local community members at par value—

100 Nepalese rupees (about \$0.87)—which is usually below market value. Shareholders earn capital gains and receive dividends based on the amount of stock held but must retain the stock for at least three years before selling.

LES was designed to achieve a two-fold objective – firstly, to ensure that development benefits of a hydropower projects spread to maximum number of households and secondly, to facilitate efficiency and transparency of the process with minimal government involvement. The idea was suggested as a mitigating measure to deter the opposition to project construction because most of the hydropower projects in Nepal have faced some opposition by rural communities. Chilime Hydropower project was the first project that adopted LES and received a favorable response from the rural PACs in Rasuwa district of Nepal where the project was constructed (Suhardiman & Karki, 2019). Subsequent studies suggested that this approach could be developed into an alternate HBSA pathway with proper legal framework and formalized as a policy measure (Dixit, 2008; ICIMOD, 2016; IFC, 2018). After several rounds of discussions, the government of Nepal institutionalized this practice into law in 2015. Thus, what initially started as an ad-hoc measure in 2010 has become a mainstream HBSA approach today in Nepal which is formalized in Nepal’s constitution (Lord, 2016a).

Nepal has 79.42% of the country’s population living in rural municipalities (World Bank, 2020) and rural residents have traditionally lagged in human development performance benchmarks. The massive size of rural population is critical in influencing the development of the entire country, which calls for the need to make rural communities’ interests central. Thus, the discourse on sustainable rural development in Nepal cannot be framed without emphasis on social justice and part of this is a more fair distribution of hydropower benefits for its rural population (Khanal, Xi, Ali, & Othman, 2021). There is little research on LES. In this study I am particularly

concerned with how LES has been received by rural households and communities in ways that might provide feedback on the impact of LES policy, which has been in place for over 10 years now. Despite some notable work about HBSAs (Shoemaker & Robichaud, 2019; Skinner, Krauss, & Newborne, 2014), an improved understanding of the perceptions of PAP about LES and their decision-making process about whether to participate in LES is necessary to advance understandings about the role of hydropower in enhancing rural development. This study aims to address this gap in our knowledge about how rural development is affected through participation of local households in LES in Nepal, which may have wider ramifications in developing countries of Global South. The study attempts to understand the perspectives of both communities through the lens of rural municipality chairs.

The next section provides background on hydropower development in Nepal, followed by a discussion on LES in Nepal. I then delve into the study methods, and this is followed by study results and discussion that examine how participation in LES shaped the community-level outcomes and highlights important lessons that can be applied for more effective implementation of LES. I discuss the need to understand the multi-faceted nature of LES impacts and the power dimensions that shape development outcomes for project-affected communities.

3.2 HYDROPOWER IN NEPAL

Hydropower is the mainstay of electricity for Nepal (Timilsina & Steinbuks, 2021), however, the lack of financing has been one of the major bottlenecks. Although the history of hydropower development in Nepal dates to 1911, the hydropower potential to generate electricity has remained largely untapped. Nepal is presumed to have 42,000 MW technically feasible hydropower capacity (Government of Nepal, 2001), however, less than 4% has been developed so far (NEA, 2020, pp. 11–12). According to Nepal Electricity Authority, the annual peak electricity

demand in Nepal during 2019-20 was 1,408 MW while the total domestic installed capacity was only 1,328 MW of which independent power producers contributed more than 52% (696 MW). At present, Nepal's electric power usage per capita is among the lowest in the world (World Bank 2018), and a bulk of energy consumed (approximately 70%) in Nepal still comes from firewood (Government of Nepal Water Energy Commissions Secretariat 2017).

Total electricity use in the country in the year 2019-20 was 7,894 GWh, of which 78% (6,174 GWh) was met through domestic production and the rest was imported from India (NEA, 2020, pp. 11–12). The demand of electricity in Nepal has been increasing rapidly over the years leading to significant gap in demand-supply gap (Nepal Electricity Authority, 2017). Moreover, with rapid urbanization and increasing use of electric household appliances, the trend is likely to continue in the coming years. With no other known sources of fossil fuel deposits in the country, Nepal is dependent on hydropower projects for electricity generation and energy security. Another argument made for hydropower construction in Nepal is the immense potential for cross-border electricity export to neighboring states of India and Bangladesh that are rapidly growing and experiencing huge electricity shortfall (IFC, 2018). Despite critics who argue against rapid hydropower growth, the Government of Nepal set up an ambitious target to increase the hydropower generation capacity of the country to 10,000 MW by year 2030 and upgrade its transmission infrastructure so that it meets not only the domestic electricity demand but also has surplus electricity to export to these markets (NEA, 2020). In that direction, the Government of Nepal has rolled out several incentive programs to promote the hydropower sector, which include the following project incentives, monetary policy reforms, and capital market reforms as shown in Figure 3 below. Broadly defined, three agencies play key role in crafting and administering these reforms, namely Nepal Electricity Authority for providing project incentives, Nepal Rastra Bank

(the central bank) for monetary policy reforms, and Security Exchange Board of Nepal (SEBON) for capital market reforms.

Project incentives	Monetary policy reforms	Capital market reforms
<ul style="list-style-type: none"> • Power Purchase Agreement for 30 yrs • Tax holiday for 10 yrs • Custom duty waiver 	<ul style="list-style-type: none"> • Banks to invest min 10% in energy • Reduced rates for hydro • Energy bonds 	<ul style="list-style-type: none"> • public listing opportunities to raise capital • foreign investment laws

Figure 3: Hydropower policy reforms in Nepal

In the areas of policy reforms, the government introduced Hydropower Development Policy 1992, Water Resources Act 1992, Electricity Act 1992 that gradually opened hydropower sector of Nepal to private capital and even foreign investment. It also instituted a 30-year Power Purchase Agreement, 100% tax exemption for initial ten years after commissioning and 50% tax exemption for subsequent 5 years, and waiver of import tariffs on necessary hydromechanical equipment. The 30-year power purchase agreement for the generated hydroelectricity mitigates the business risk for hydropower projects to a great extent because it is based on “take-or-pay” principle at pre-determined rates. In terms of monetary policy reforms, the Central Bank of Nepal, has introduced several provisions in monetary policy mandating all Nepalese commercial banks allocate at least 10% of their investment portfolio to energy sector by mid-July 2024 (Nepal Rastra Bank, 2020, pp. 363–367). This measure ensured that debt financing was available to hydropower development. In capital market reforms, the Security Exchange Board of Nepal (SEBON) reformed its policies on public listing of hydropower companies thereby making it convenient for such enterprises to raise equity in the capital market.

Until 2010, Nepal was following the royalty sharing mechanism as the primary HBSA model. Under this arrangement, the Government of Nepal collected capacity royalty and energy royalty annually from the hydropower projects for their installed capacity and utilization of water from the designated rivers, a portion of which is eventually distributed to local governments for the benefit of local households (Nepal Electricity Act 1992). Per existing royalty regulation, the capacity royalty amount and the energy royalty amount jump ten-fold and five-fold respectively after 15 years of commercial operation of a project (Pant, Rao, Upadhaya, & Karky, 2014). In principle, this revenue-sharing approach seems like a good prospect for communities because local governments are eligible for a 50% share of such royalties collected since 2004 (Local Self Governance Act and Rules, 1999). However, this approach was designed to promote rural development through transfer of benefits to local administration, and not directly with the individual households. Furthermore, this HBSA also failed to generate enough confidence among the general public with regard to inclusivity and transparency thereby leading to trust issues among the stakeholders (Balasubramanya et al., 2014).

3.3 HYDROPOWER LOCAL EQUITY SHARE IN NEPAL

Hydropower local equity share (LES) was first introduced to Nepal in 2010, and today it has become the mainstream form of HBSA in the country. Interestingly, this form of HBSA is practiced only in Nepal, and this study examines the perceptions and experiences of community leaders about their participation in this arrangement.

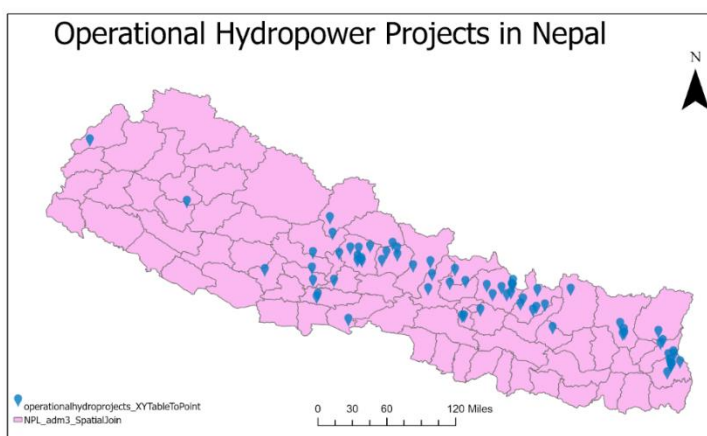


Figure 4: Map of the Location of Hydropower Projects that have Issued or Received Approval to Issue IPOs

Figure 6 shows the spatial distribution of private hydropower projects across Nepal that have gone public or are in the final process of issuing as of December 2021. Most of these projects are in central and western Nepal, located near four largest cities of Nepal namely, Kathmandu (center), Pokhara (mid-west), Butwal (west), and Biratnagar (east). Thus, the far-western region of Nepal is lagging even though it has potential for hydropower. The hydropower projects that have issued IPOs are not equally distributed across Nepal. This map also indicates that more hydropower projects were developed in around regions that had greater access to roads and other infrastructural facilities. Appendix C lists these hydropower projects, which are listed in the Nepal Stock Exchange as of the end of December 2021, many of whom have provided local shares as part of the LES.

LES in Nepal emerged with the development of the 22.1 MW Chilime hydropower project in Rasuwa district. In 2010—seven years into the operations phase—the project company, a subsidiary of the Nepal Electricity Authority, agreed to local demands for equity shareholding. It

worked out for the company because it was already generating profit when issuance of local shares was announced. So, local shareholders received a positive economic return on their investment.

According to the Securities Registration and Issuance Regulation 2008, if a hydropower company decides to go public by offering 30% of its shares to public, shares up to 10% of that share should be allocated to the PAC. In 2019, SEBON added new criteria for hydropower companies such as credit ratings (SEBON, 2019) and satisfactory construction metrics to qualify before listing in order to safeguard the interests of public shareholders and PAP. Figure 6 below presents a flowchart that shows the steps in the process required for LES in Nepal.



Figure 5: Process of Initiating LES Flowchart

Public listing of any hydropower project in Nepal is carried out in two stages. In the first stage, a limited IPO is announced targeting PACs, which is the LES, and in the second stage, a general IPO is announced targeting general public nationwide. Any private hydropower project who wants to go public will have to obtain prior approval from Security Exchange Board of Nepal (SEBON) for listing the project in Nepal Stock Exchange. The process begins with the project company submitting all stipulated documents to SEBON, who conducts its due diligence whether the project company has met all statutory requirements. Once approved, the project company rolls out its Initial Public Offer (IPO) Prospectus that details information about the project's technical specifications, financial position, status of construction, key promoters, and the projected scenario. The document features information about the geographical areas that are eligible to participate in the LES as PACs, who are the rural municipalities and districts whose households are eligible to

participate in the LES. This prospectus also discloses the credit rating of the project from independent credit rating agencies e.g., CareEdge Ratings Nepal and ICRA Nepal. A sample credit ratings report is provided in Appendix D. PAP can find information about the project in the prospectus, which is generally published in national newspapers and information is disseminated through radio, television, internet, social media, or print media channels. People are also getting such information about upcoming IPOs from social media, such as groups in facebook, whatsapp, and viber. PAP from designated rural municipalities have a period, typically only a couple of weeks, to participate in the process. If the shares assigned for local households are not fully subscribed, then the company bundles up the unsubscribed shares to the stack of shares that are made available to the general public.

Residents from PACs typically draw upon different sources, often family savings or personal loans. However, remittance income is a major source since about 30 percent of Nepal's GDP reportedly comes in the form of remittance (Sharma et al., 2019), although the actual volume of remittances could be much more than that reported because of the many informal channels of sending money back. As per the Economic Survey 2016/17, every one out of two individuals in Nepal receives remittance every year. That said, mobilizing sufficient sums of money for putting in application for local shares in a hydropower project has been reported as a major constraint for poorer households in rural Nepal (IFC, 2020).

A detailed wealth and poverty profile of PACs varies across different rural municipalities would give us better demographic profile about different aspects of LES participation, such as who is participating and what kind of partnerships within families or between families or other information about who is actually participating in LES. More granular and current data will be released after publication of detailed report of census 2021 by the Department of Statistics,

Government of Nepal. There are several criteria that would make an individual eligible for participation in LES such as a citizenship card (*naagrikta ko praman patra*) and a birth certificate (*janma darta ko praman patra*) that have place of birth, a marriage certificate, land deed or a migration certificate (*basai serai ko praman patra*) that is issued before a project started construction (based on conversation with community leaders and project companies).

There is also some risk that PAP in rural Nepal who are not connected to the formal banking system may be excluded from participating in LES. Moreover, the increased automation in Nepal's capital market and its integration with online banking services presents both opportunities and challenges to aspiring shareholders from rural Nepal. For instance, participants do not have to be physically present at collection centers of the share issuing manager (IFC, 2020). Education and building the capacity of rural households to use the online share application platform has been initiated through microfinancing institutions; mothers' members group (*Aama Samuha*); women's savings and credit groups; and community-based user groups that have been assisting women and people from marginalized communities in learning and adopting new financial systems (parent, 2020; IFC 2020).

SEBON has reformed its share allotment structure to make the process more equitable. For instance, the allotment process works in such a way that every applicant is ensured at least 10 units of shares in the first round of allotment. In the second round, those applicants who applied for more than 10 units of shares are again apportioned another 10 units of shares each. This cycle continues as long as there are enough number of shares to be allocated to the remaining applicants in blocks of 10. Thereafter, recipients for allotment are selected through a lottery (SEBON).

3.4 METHODS

Study design: The study was conducted across rural municipalities in Nepal. The country is divided into 7 provinces, 77 districts, and 753 local bodies. Of these local bodies, there are 460 rural municipalities (or *Gaunpalika*) that can be considered as sub-unit administrative divisions of a district. As per part 17 of the Constitution of Nepal, each rural municipality is governed by an executive council that is headed by a chairperson (or simply, a chair). This study aims to understand the perceptions of rural municipality chairs and how they make decisions regarding participation in LES, from the perspective of both the individual households and as community representatives. I chose to interview rural municipality chairs who are community leaders. Many research studies have used semi-structured interviews with community leaders for assessing community perceptions. For example, Castillo (2015) studied community-based leaders' perspectives on the challenges, best practices, and recommendations for ensuring Indigenous women's health rights in Nepal. In another study, Chen & Akamine (2021) used in-depth interviews with village leaders to collect ethnobotanical data about cultural values of Fukugi trees. Rural municipality chairs are well positioned to share their experiences and perspectives about the changes within their communities with respect to participation in LES. They were asked to share their insights about the spatial and temporal aspects of hydropower, provide their perspectives about LES participation and outcome, and speak about experience of local households with LES at a community level. This study uses semi-structured interviews as part of the grounded theory approach that is applied here. Glaser and Strauss were the founders of grounded theory who used this approach to examine the experiences of terminally ill patients with differing knowledge about their health status (Creswell, JW., 2016). The methodology is grounded in data and it is useful when the objective is to construct an explanatory theory to examine a process that is inherent to

the substantive area of inquiry (Thornberg & Charmaz, 2014). Grounded theory is an iterative process as shown by the design framework given below (Tie, Birks, & Francis, 2019)

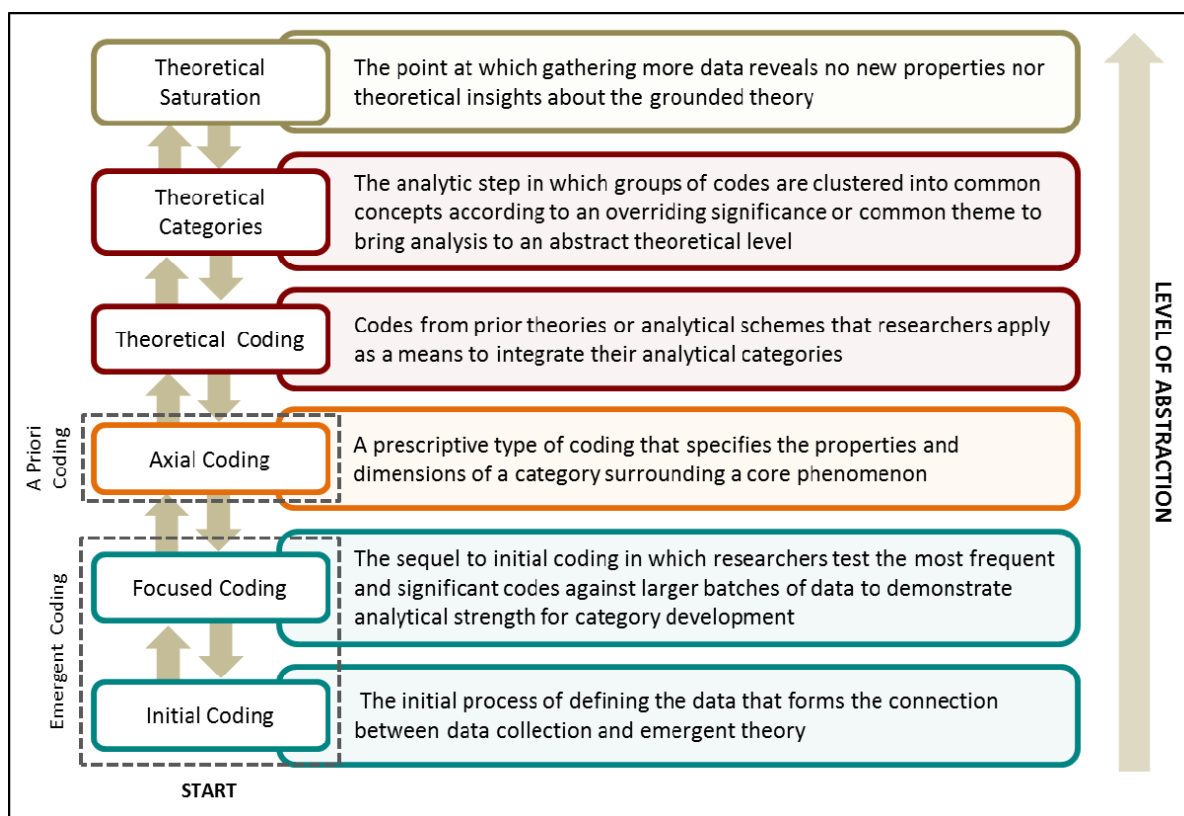


Figure 6: Grounded Theory Design Framework (Tie, Birks, & Francis, 2019)

Recruitment and Data Collection: Inclusion of smaller number of carefully selected subjects in semi-structured interviews can be valuable in research (Baker & Edwards, 2012; Silverman, 2013). My first step involved obtaining approval from the University of Nevada, Reno for human subject interviews. This was followed by recruitment of rural municipality chairs. Most of the rural municipalities in Nepal maintain an active website, and these websites have contact information about rural municipality chairs. I contacted 67 chairs over phone, email, social media, and common network. Of these, 35 respondents responded, but only 28 ended up participating in semi-structured interviews. The study participants were mostly middle-aged males.

The selection of rural municipalities from which rural municipality chairs were sampled was based on the location of hydropower projects. The sample selection was meant to represent a cross-section of small hydropower projects that were publicly listed on Nepal Stock Exchange (NEPSE). Selection criteria of rural municipalities: (i) the rural municipality hosted a hydropower project constructed after 2010; (ii) the hydropower development company must have floated Initial Public Offering (IPO), and they are listed in the stock exchange, (iii) the project must have allocated shares to PAP as part of LES.

Department of Electricity Development, Government of Nepal maintains an updated list of hydropower projects, addresses, and their geographical coordinates (<https://www.doed.gov.np/license/54>). A list of rural municipalities was collected from Nepal hydropower portal's geodatabase (<https://hydro.naxa.com.np/core/datasets/>). As of December 2021, only forty-five (45) small and medium hydropower project companies had gone public or issued initial public offerings (IPO) in the Nepalese Stock Exchange (NEPSE, 2021) and these are listed in Appendix C. As of December 2021, Nepal has had 107 operational hydropower projects above 1,000 KW capacity, both public and private and there are more than 207 projects under various stages of construction (<https://www.doed.gov.np>). However, not all operational projects are publicly listed companies. For the hydropower projects constructed before 2010 (e.g. Butwal Power Company) they were not obligated to issue shares, some decided not to go public (e.g. Himlal Power Company), while for some others the processes have been held back by SEBON because of their poor credit rating (SEBON, 2019, pp. 313–330). Appendix C shows the 45 hydropower project companies that are listed in NEPSE as of December 23, 2021 (NEPSE, 2021). Four of the listed power companies (Mountain Energy, Rasuwagadhi, Sahas Urja, and Upper Tamakoshi) are medium or large hydropower project companies, so they were excluded.

Interviews: Interviews and data collection occurred between July to November 2021. Seasonality would affect the interview participation because this period is often the harvest season in Nepal. I had no prior relationship with study participants. Primary data included semi-structured interviews with community leaders from study sites (n=28). The interviews were digitally recorded (audio) after obtaining prior consent from individual participants. Two of the interviews were conducted a second time to get a better understanding of the participants' previous points. Each interview lasted between 40 and 80 minutes.

Data analysis: The digitally recorded interviews were transcribed soon after completion of each interview. Interviews done in Nepalese language were subsequently translated into English during the transcription process. I acknowledge that the process of interview transcription may have some implications such as losing the emphasis or the meaning of languages. However, I did take notes and recorded memos at each interview that helped with initial analysis of the interviews. Data collection was completed the themes kept repeating. Analysis using the grounded theory followed a three-step coding process: In the first step, i.e., *open coding*, I broke down each transcript (n = 28) into individual excerpts or snippets based on our interview questions. I compared the snippets of the interview responses and created codes to connect them. In the second stage, i.e., *axial coding*, I compared codes and created different categories (n=10) that connected the codes. It was an iterative process to review and refine the codes as I progressed through the interviews. In the final step, i.e., *selective coding*, I compared the refined categories (n=5) and formed a core theme encompassing all other categories (Thornberg & Charmaz, 2014). The entire coding was done with NVivo, but I also analyzed it manually to make sure that I was not too distanced from the data.

3.5 FINDINGS

From the responses to the interview questions about motivation to participate in LES, impact of participation, past development experience, future outlook, and their perceptions about meaningful participation in the process, I deduced several themes in the analysis that could be broadly grouped into four categories: *LES and household finances*; *LES and changing governance*; *LES and resisting uneven development*; and *refining LES*. Finally, I deduced that all these four categories pointed to an overarching theme: *rural development starts at the household level*.

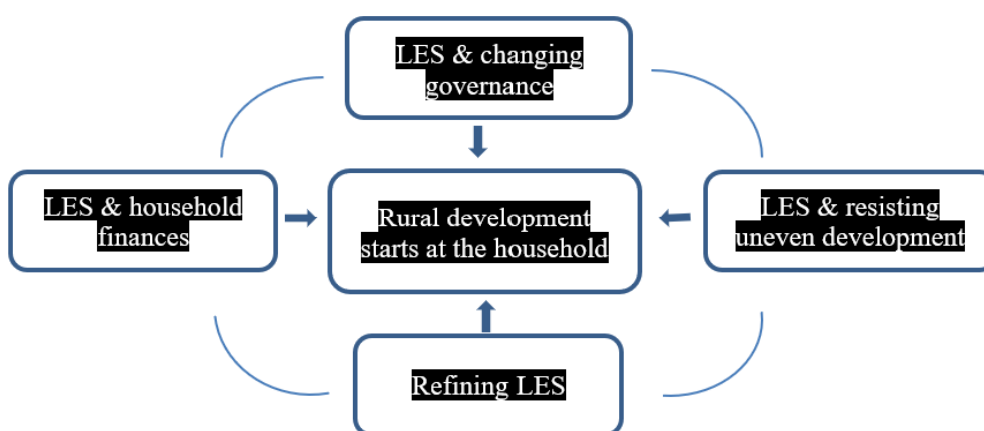


Figure 7: Community Leaders' Perceptions and Experiences with LES

3.5.1 Overarching theme – *Rural development starts at the household*

“Rural development starts at the household” is the core theme. In other words, each household is a participating unit in the rural development of Nepal because of the decisions of the household as a unit. It was my initial assumption that LES was designed to convey a message to individual households that inclusivity and transparency should be promoted. My assumption was based on a widespread belief that households are key anchoring blocks of rural economy, and hence, they should be part of the larger debate on rural development. The study participants also

felt that the households should make a prudent choice themselves on their participation in LES. The idea of household as the key spatial unit underpins the other themes raised by rural municipality chairs, both from their personal perspectives as well as from the viewpoint of the communities they discussed.

Study participants noted that some residents made their decision purely out of self-concern for their household as they exercised their option to participate in LES. There was a notable observation that people seemed to be driven by their individual needs or self-concerns to safeguard their family members' interests. Many study participants felt clearly that the participation of individual households in LES was a pathway to make informed decisions and put themselves in better control of their destiny, as observed by these study participants:

“It would be great if the value generated from investment in LES would contribute something toward our children’s higher education” (Chair 26).

“Yes, I think it has turned out well. If we look at the solid performance of the company and consistent returns to its shareholders, the investment was worth it. The share price is also about 4.5 times in just 5 years” (Chair 26).

Other study participants considered this approach as a win-win situation that could lead to sustainable development for the entire community. Some participants were optimistic that empowering individual households would eventually mean better outcomes for the entire community, with a caveat that returns would only be available to those who participate in LES, as mentioned by this study participant:

“LES is interesting because it allows local households to directly participate in the infrastructure projects. Participating households can either dispose their stocks for instant returns, or they can keep it for future investment long term. Therefore, it supplements rural development; however, the distribution of its benefits is limited to only those households that participated” (Chair 01).

3.5.2 Theme 1: LES and household finances

This theme characterizes the unique situation of rural households in project-affected areas, where participation in LES reflects their financial decisions and interaction in rural economy. Nepal has roughly four-fifth of its population living in rural areas (Asian Development Bank, 2018), and rural households do not feel like there has been enough attention paid to their situation in the past (Balasubramanya et al., 2014). The study participants generally believed that they had heard rhetoric about hydropower projects and HBSAs (Lord, 2018), but they had experienced negligible impact on their finances. As noted by many study participants, LES was viewed as opening up some avenues of investment for the rural households:

“If the local households were able to sell their stocks today, then they would have more cash now because the price has appreciated more than 1,100% in just one year” (Chair 17).

“I don’t expect to make tons of money by investing couple of thousands of in a hydropower stock, but I think it will be worth it if it could be of some good use in the future in times of emergency” (Chair 25).

Some study participants felt that they, or the residents in their rural municipalities, had seen enough of other HBSAs and now wanted to try out new approaches. This resulted in some households being eager to try out this new arrangement of LES, because they felt like it could not be any worse than their experience with other forms of HBSAs. Furthermore, LES insured that the price of the stock could not fall below the base price they originally paid. In other words, study participants felt that even it failed, the outcome wouldn’t be as bad as the other forms of HBSA.

“Absolutely so; people who had participated in the local shares in the projects in our municipality have at least doubled their initial investment, which is actually good. So yes, local households should have more cash now and it should grow in future” (Chair 02).

Although several study participants were skeptical of participating in LES, the majority of them shared that they were trying to diversify their investments. For instance, Chair 05 mentioned the importance of diversification of income generating activities:

“I think people who invested just wanted to take a chance because they were not sure if it will really turn out well. So, I guess, diversification of livelihood was the factor, but I can’t tell for sure” (Chair 05).

The community leaders seem to have heterogenous views on the impact of LES participation upon the community. While some participants seemed to believe that the income level of households increased in general, thereby benefitting the entire community, others expressed concern over whether household benefits translated to community development. In either case, disappointment with the previous suboptimal HBSAs was likely a common denominator in both camps.

“Income distribution and education is highly inequitable and as a consequence, the ability to invest in stocks and LES is highly skewed” (Chair 20).

“The project declared its 10% dividend this year which was more than double than that announced last year. This is not much for sure, but the investors have benefited from the appreciation in stock prices which is almost 5 times their initial investment made 5 years ago” (Chair 12).

As on July 3, 2021 all publicly traded hydropower projects were trading between 2.6 to 9.3 times their base value as presented in Appendix C (NEPSE, 2021). In addition, hydropower project companies using LES also have an opportunity to continue to mobilize domestic capital if their project expands. Chilime SHP (22.5 MW) was the first hydropower project to offer 10% shares to the locals affected in the Rasuwa district while it offered 15% to the public in 2010. The company has consistently distributed regular dividend and bonus shares to its shareholders over the years, and as on July 3, 2021 the company’s shares were trading at 6.6 times the base price. Similarly, Ngadi Group Ltd (Siuri Khola SHP) that was commissioned in 2012 has its shares trading at 4.93 times the base value. Another project in case, Ruru Hydropower project that was commissioned in 2015, has its shares trending at 9.36 times the base value.

3.5.3 Theme 2: LES and changing governance

Trust in institutions comes with transparency and feedback mechanisms (Buechler, Sen, Khandekar, & Scott, 2016), which were issues associated with previous HBSAs in Nepal. For instance, some study participants noted that the royalty sharing arrangement and ecosystem services lacked transparency and was not effectively monitored. Access to information also factors into PAP's trust and their experiences with LES, as noted by this study participant:

"I would say most of the information was available from the social media, family, and friends. People now a days have increased access to internet, social media, and news channels, and therefore the information more readily available nowadays than in the past." (Chair 11)

Inclusivity is another of the fundamental elements of LES model. The whole premise of LES is that it is designed to be transparent (Shrestha et al, 2015; IFC, 2018) and that it must prioritize PACs in the ownership of stocks in the private hydropower projects. However, there were several participants, particularly from the eastern Nepal, whose viewpoints varied from favorable to unfavorable about participation, such as these study participants:

"Yes, I have participated. How was my experience? It's actually been a mixed bag" (Chair 07).

"No, I have not because I do not completely trust the quality of information that is provided to us by the private hydropower companies. There are many examples of projects, where the investors have not earned any dividends even after years of commercial operation" (Chair 19).

In this study it was found that study participants located where hydropower projects were built after 2015 were generally more positive than those who participated in LES before that time frame. Part of the reason could be that SEBON reviewed the performance criteria for private hydropower projects during and after 2015 before they were approved for IPO. Consequently, only strong projects were able to raise equity from local households. Another important feature of hydropower development in recent years is that the hydropower sector is now attracting investment

from more reputable business organizations and corporations, which has helped increase the quality of disclosure standards.

“..., with big corporate houses constructing more projects in recent years that are not only environmentally sustainable but also financially profitable, the community is now more receptive to the idea of local share” (Chair 13).

3.5.4 Theme 3: LES and resisting uneven development

This theme identifies the experiences of rural municipality chairs and their constituent households as they resist uneven development, including the impacts of uneven development in the hydropower sector. The majority of study participants shared observations about when a hydropower project is built in a rural region, the benefits in the form of generated electricity is mostly transmitted to urban centers, while the rural areas were left to deal with the environmental consequences. There was almost unanimous sentiment that all previous forms of HBSAs like the royalty sharing and development trust arrangement didn't do enough to change this situation, as observed by this study participant:

“The district was ignored when it comes to infrastructure budget allocation. Consequently, there is less investment in roads, bridges, power lines, and schools in the district, which is reflected in less market access for our agricultural products to the cities and urban centers” (Chair 19).

There was almost unanimous concern that households in their rural municipalities didn't feel that the development efforts were sufficient in the past to bring positive changes into their lives. Much of their perception towards the previous forms of HBSAs was not positive because of their inability to participate in it and the feeling was exacerbated by their past experience with weak development programs in their rural municipalities. Apparently, many of the study participants considered LES as a pathway to participate in the process of inclusive growth, as stated by this study participant:

“I do see that in principle, LES can lead to better earning potential and diversification of livelihood. If this happens, then it has a direct implication on improvement of rural development” (Chair 7).

This, however, did not mean that all respondents were equally enthusiastic about participation in LES. Several study participants wanted to exercise caution with this new approach being uncertain about how it would influence rural development. The majority of the respondents commented that there could be some connections between LES participation and rural development, however, such ad-hoc policies were not solutions because the government still had to step up and ultimately take ownership for the development policies, as noted by this study participant:

“I think the whole idea [that LES helps rural development] is hilarious because local households are either lacking in resources (information, knowledge, and capital) to participate in such experiments. But more importantly, I want to make clear that such efforts cannot replace the role of government in rural development” (Chair 20).

3.5.5 Theme 4: Refining LES

The final theme that was identified was refining the effectiveness of existing mode of LES and how this might be improved for better outcomes. Many respondents commented that, although they welcomed LES provisions, they would expect more positive changes. Several respondents highlighted that participation rates of households were still low because of the way it was structured. For instance, they expected that the participation of average households would be diminished if the average household saving rate was low or if their access to financing was prohibitive, which is the case in many rural areas of Nepal. Other respondents reported that there was inconsistency in the period for the project-affected households to apply for the LES or that this period was too short, such as stated by this study participant:

“I think the 15-day window period to apply for the local shares was too short for many households. It should be extended to at least 30 days so that more households can arrange their finances and participate in the process. Otherwise, the process will not be inclusive which is the sole purpose.” (Chair 26)

Another study participant thought it would be more equitable if share pricing was commensurate with the resources available to different households, as noted by this study participant:

“... it is not fair that project-affected local households and urban households pay the same price for shares of a hydropower project during the IPO.” (Chair 28)

Along with greater inclusivity, some study participants wanted more focus on collective goods of the community, with the goal of LES being the ability to bring equity and justice in the distribution of cost and benefits arising out of hydropower projects. In other words, they thought LES should make communities' greater good the common denominator, which is reflected in the idea mentioned by this study participant:

“...how about turning the local household's share into preferential shares so that they get prioritized over the dividend distribution” (Chair 7)

This study participant suggested reinforcing transparency and efficiency within the structure of LES:

“Perhaps make the LES process more transparent and time efficient, because it currently takes weeks if not months for the process to complete.” (Chair 17)

3.6 DISCUSSION:

Rural municipality chairs interviewed in this study shared their experiences and perspectives, both for themselves and as a community leader. These study participants felt that *rural development starts at the household level*. For some study participants, LES offered hope that inclusive development was possible or instilled hope that the future could lead to better lives and livelihoods. Although some study participants believed in “LES as the best alternative option” to improve the lives of their residents may have been optimistic, they did not necessarily envision a straightforward path forward because of the uncertainties involved.

Some study participants emphasized that past rural development initiatives and previous HBSAs were underwhelming so they had nothing to lose by engaging with LES. For these rural municipality chairs, HBSAs, such as royalty sharing programs, were perceived more as a top-down approach with limited participation of local households as noted by Balasubramanya et al. (2014). Those who felt direct participation in LES would be positive still thought that management of expectations from LES was critical. In particular, there were concerns about degree to which the households' expectations will be fulfilled by participation in LES. Although shares are offered at base price, thus providing some financial protections for rural households, there could be gaps between perceived benefits and actual received benefits because not all hydropower projects could deliver on the projected stream of benefits envisioned. For instance, while Chilime Hydropower project has been beneficial for participating households because of its low construction cost and lucrative power purchase agreement (Merrey, Hussain, Tamang, Thapa, & Prakash, 2018), other projects may not be as financially attractive. This is particularly true in case of Nepal, where projects are exposed to different risks because of both natural and human factors.

In considering how LES was connected to changing governance, building trust by local residents in LES was raised as an important issue and this finding is consistent with other studies (Balasubramanya et al., 2014; Shoemaker & Robichaud, 2019; Wang, 2012) that have identified trust in the system as a central component of good governance and decision-making. Some study participants believed that the households that had participated in LES would receive better benefits in the long run, which raises the question of what, or perhaps more importantly who, defines "better benefits"? There is a possibility that not participating in the LES could be beneficial for a household because they could potentially employ their financial resources elsewhere to earn better

returns. However, some rural municipality chairs prioritized achieving sustainable longstanding development over individual short-term fixes.

It is noteworthy to mention the dichotomy that could exist between the perspectives of individual households and community leaders when it comes to participation in LES. Given their limited resources and few alternative options available, residents of households may feel that they do not have the luxury of caring too much about the common benefit that would affect the entire community. So, when making decisions about their individual participation in LES, a household may seem to be more motivated by its individual self-interests. However, in the bigger scheme of things, improvement in the socioeconomic condition of each individual household may eventually result in the collective “greater good” of the rural community.

3.7 CONCLUSIONS

Nepal’s hydropower sector has witnessed an exponential growth of hydropower project construction and an adoption of LES. The country seems to have adopted the narrative that it could turn its “water into wealth” and eventually use this resource for greater socioeconomic good. In that direction it has structured several HBSA programs, including LES, which was implemented in 2010. This study offers a perspective on decision-making by project-affected households and community leaders in rural municipalities across Nepal. This research offers a first analytical study in LES that is grounded by qualitative data in the context of hydropower projects. As such, it offers a new direction for exploring the perceptions and experiences of rural leaders and residents with LES.

Nonetheless there are some limitations to the study. First, due to the inability to do fieldwork during the pandemic, study participants spoke on behalf of both their own household as well as for

their community. To make this somewhat less complicated, study participants were asked to make a distinction between what their own individual perceptions and experiences were from what they had seen within their community but nonetheless this remains somewhat challenging. Second, rural municipality chairs are elected representatives, so there is a possibility that their perceptions could be influenced by their party affiliations to be less or more critical of the participation in LES in their responses. To mitigate this limitation, the interviewees were asked questions without reference to partisan issues. Third, the study reflects that individual's perceptions and experiences differ. As such, the perceptions and experiences of those rural municipality chairs participating in this study cannot simply be said to be those of all local leaders across Nepal. More studies are needed to investigate the experiences and perceptions of rural municipality leaders with other hydropower projects. Finally, human perceptions and experiences are dynamic and are influenced not only by educational, political, economic and social conditions but also by the expectations of LES. Longitudinal studies to investigate the effects of various changes on the perceptions of local households towards LES could be useful to capture these changes over time and space.

Chapter 4. HYDROPOWER LOCAL EQUITY SHARING IN NEPAL AND THE VIEWS OF HYDROPOWER DEVELOPERS

4.1 INTRODUCTION:

Hydropower development has always been controversial as it is fraught with challenges and complications given the diversity of capital sources and investment designs that have emerged in the 21st century (Ahlers, Budds, Joshi, Merme, & Zwarteven, 2015b; Merme, Ahlers, & Gupta, 2014). While a global pushback against hydropower dams led to reduced investment in dam construction during the last decade of 20th century, in the aftermath of the WCD 2000 Report, construction of hydropower dam projects has ramped up alongside increased global interest in financing extractive industries and changing access to a complex array of capital arrangements (Markkanen, Plummer Braeckman, & Souvannaseng, 2020; Christopher Schulz & Saklani, 2021). While opponents continue to point out the uneven impacts of hydropower development, especially the problems such development can pose for PAPs, proponents have successfully financed and are moving forward with many projects by arguing that switching to hydropower is instrumental to mitigating climate change as well as to meeting UN Sustainable Development Goals 2030 (Lord, 2016b; Manorum et al., 2017; Shoemaker & Robichaud, 2019; Crootof et al. 2021). In the case of Nepal, an oft-repeated argument is that the abundance of hydropower potential in the country makes it a “hydropower nation” and this should be harnessed so the country can reap significant economic dividends (Lord, 2014, 2016a; Shakya, Shrestha, Shrestha, & Rajbhandary, 2016). Proponents of hydropower development in Nepal forcefully argue that the net positive benefits – economic, social, environmental – to PACs due to hydropower projects will exceed the costs (Dixit

& Gyawali, 2010; Koirala, Hill, & Morgan, 2017). Others argue that the country's hydropower sector has become uncoordinated and chaotic as many race to build small projects and make profits (Movik & Allouche, 2020; Crootof et al. 2021).

A quick look at Nepal's total electricity generation capacity showed that its total capacity from hydropower projects was 1,924 MW as on February 21, 2022 (DOED, 2021), while the theoretical potential is understood to be more than 43,000 MW (H. Shrestha, 1966). In the past decade, more than half of this production capacity comes from hydropower projects funded by private investors within Nepal, referred to as independent power producers (IPPs). Out of 108 operational hydropower projects, 91 projects are led by IPPs (NEA, 2021) and many of the proposed projects are as well. As such, IPPs and their companies play a significant role in shaping the Nepalese hydropower landscape (ICIMOD, 2016).

Private hydropower companies in Nepal must secure sufficient capital for their projects, while simultaneously addressing issues raised by PACs (Crootof et al. 2021). To meet both these ends, the government of Nepal adopted the LES program of HBSA in 2010 that was aimed at delivering equitable distribution of costs and benefits to rural communities. IPPs in Nepal were among the earliest supporters of the LES program because they perceived it as a pathway to deepen the engagement of local community and to build legitimacy for a project (Dhillion, 2019; Hoelscher & Rustad, 2019; Ogino, Nakayama, & Sasaki, 2019; Crootof et al. 2021), while at the same time enhance their capacity to raise capital for hydropower projects. By opening-up small-scale hydropower projects for up to 10% local participation (ICIMOD, 2016) and sharing project revenues with affected communities, LES was strategically designed to mitigate local opposition to projects those extractive industries often provoke. LES can be considered as a mini-IPO event where only PAP can participate. But since the number of shares to be allocated to the individual

applicants from PACs are limited to 10% of paid-up capital, it is a first-come, first-served in PACs until such shares are exhausted. There are no known cases where PACs have coordinated to “buy in” together, but it is more common that individual households buy in.

On one hand, LES can be seen as a novel mechanism that presents a creative means to constructively engage PACs, make them direct stakeholders in the project, and provide a potential avenue for increasing household revenues. On the other hand, LES can also be viewed negatively as a means to coopt rural residents that only reduces the risks associated with social conflicts prompted by project development. This study aims to extend beyond such dualistic viewpoints to better understand the experiences and perspectives of IPPs in Nepal ten years into LES. This study builds on a recent study by Schulz and Saklani (2021) that examines private sector hydropower developers in Nepal. My focus here is on the experiences and perceptions of IPPs with LES in Nepal. How has LES influenced the mobilization of capital by IPPs for hydropower development within Nepal? How do IPPs view LES as influencing community relations with project-affected peoples? In what ways do IPPs characterize LES as supporting rural development?

As important stakeholders in the hydropower landscape of Nepal, IPPs make decisions that can either support small-scale hydropower projects or redirect capital towards other projects with different ends. While the complexities of financializing hydropower have garnered attention from some researchers (Ahlers & Merme 2016; Ahlers 2020), geographers Schulz & Saklani (2021) specifically studied private hydropower developers, planners, and investment specialists in Nepal with the aim of understanding the broad range of factors that enable and constrain private sector investment in hydropower sector in Nepal. By contrast the present research contributes to an evaluation of LES as a policy from the standpoint of IPPs perspectives and experiences with capital mobilization, community relations, and rural development with respect to LES. As such, this study

is designed to inform future policy about LES with respect to its implementation and its potential to enhance rural development in Nepal as well as contribute to better understandings about the potential for LES in other countries considering hydropower policy formulation with an eye towards impacts on rural development.

4.2 OVERVIEW OF FINANCIALIZATION IN HYDROPOWER IN NEPAL

4.2.1 *Financialization of Hydropower Sector in Nepal*

Financialization refers to an increased influence of financial markets, financial motives, financial actors and financial institutions in shaping the operation, governance, and structure of economies (Epstein, 2005). Hydropower sector on a global scale has thus witnessed an increased encroachment of financial market and financial actors such as World Bank, Asian Development Bank, and International Finance Corporation. In recent years, rent-seeking behavior has also made advances in hydropower and renewable energy sectors that led to a shift from “real economy to financial economy” (Loftus, March, & Purcell, 2019). Nepal’s hydropower sector too has witnessed increased involvement of financial actors especially after liberalization of its economy and opening the hydropower sector to private investors in 1991. In the past, the energy and hydropower sectors were driven largely by government planning and financing. Recently, more hydropower projects are built with private capital than with public funds, which has the potential to change the role of dams as instruments of political, financial, and territorial power because of investors’ profit-maximization motives (Ahlers, 2020; Loftus et al., 2019). However, with increased interest by private investors, there has been a shift in hydropower projects including structural reconfiguration in ownership, agency, and investment strategies (Shakya et al., 2016; R. S. Shrestha & Features, 2017). The profit motive of private investors attracts financial resources

to hydropower sector, but it does not reduce inequalities in the distribution of project costs and benefits. For example, privately-funded hydropower projects in Nepal usually get financing from local financial institutions on purely commercial terms, which stipulates the companies to justify that the revenue would stay robust, and that the free-cashflow from their hydropower projects would be sufficient to service their debt liabilities (Crootof et al. 2021; Shakya et al., 2016). With the government of Nepal identifying the energy sector as an area of priority (Asian Development Bank, 2018; WECS, 2017) and the Central Bank of Nepal mandating all commercial banks to lend to energy sector up to 10% of their total loan portfolio (Nepal Rastra Bank, 2020, p. 358), activity has increased in the hydropower sector. Moreover, policy reforms related to capital markets in Nepal during the last decade have also enabled IPPs in Nepal to tap into the capital market to raise capital (Giri, 2016).

Just like any other extractive industry, privately-funded hydropower projects, typically face the challenge of building legitimacy as they try to engage with rural communities (Huber & Joshi, 2015; Lee & Byrne, 2019; Martínez & Castillo, 2016; Sovacool, 2021). Although, hydropower companies may initiate corporate social responsibility actions to connect with local communities in the region to build legitimacy (Fearnside, 2015), past legacies shape the communities' perception towards them. Often rural communities view project companies' paternalistic and philanthropic approaches with deep resentment and mistrust because they do not believe such measures will create shared economic benefits, either in the short or long term (Hoelscher & Rustad, 2019). The WCD 2000 Report recommended that hydropower project companies need to bring in forward-looking measures that could dispel past legacies and regain trust of residents of rural communities. However, this can get complicated when two antithetical approaches come together in a single venture, one trying to maximize the private profit and the other trying to

improve the socioeconomic benefits. Thus, the move of the private sector into hydropower development has the potential to further complicate the situation, particularly in the context of equitable distribution of costs and benefits between dam developers and rural communities (Ahlers & Merme, 2016).

4.2.2 *Financialization and LES in Nepal*

Hydropower development in Nepal has undergone some structural shifts in the last three decades. Prior to liberalization in 1991, the hydropower sector in Nepal used to be an entirely government domain with negligible engagement of private entrepreneurs. The participation of PAC households were also minimal during the planning or construction stages (Shakya et al., 2016). Nepal Electricity Authority (NEA), a government agency, constructed hydropower projects as well as oversaw transmission and distribution of the generated electricity in Nepal. Unfortunately, the agency soon started suffering from bureaucratic inefficiencies and mounting losses, and found itself without enough funds to invest in new projects (Shrestha & Features, 2017). After the country transitioned to multi-party democratic system in 1991, several policy reforms were introduced to manage natural resources e.g., Hydropower Development Policy 1992, Water Resources Act 1992, Electricity Act 1992, Foreign Investment and One Window Policy 1992, Hydropower Development Policy 2001, and National Water Resource Strategy 2002 that opened-up the Nepalese hydropower sector to IPPs (Balasubramanya et al., 2014; ICIMOD, 2016; Lord, Drew, & Gergan, 2020). Growing population and rapid urbanization also increased the domestic demand for electricity in the country, and NEA offered long-term power purchase agreements to IPPs in order to incentivize more production. A 30-year long Power Purchase Agreement is based on take-or-pay principle, which essentially mitigates the market risk for investors. Private entrepreneurs perceived this as an investment opportunity (Ahlers & Merme,

2016) and now they started bringing in private capital, modern technology, and management skills. Unfortunately, most private hydropower developers continued the old legacy of top-down approach in the dam planning and construction (Dixit & Gyawali, 2010; Sovacool, Dhakal, Gippner, & Bambawale, 2011). For example, implementation of socioenvironmental mitigation measures, such as environmental flows and ecological protection, were weakly monitored, and informed public consent was not a top priority for IPPs, which reduced the trust of local communities on such private projects (Dhillion, 2019; IFC, 2018; SEBON, 2019). Meanwhile, a decade long civil conflict (1998-2008) in Nepal with its roots in rural poverty and inequality also helped raise awareness about the rights and plights of PAP. IPPs were also struggling to find more amenable pathways to navigate through this complex situation, so when the LES approach was proposed in 2010, they enthusiastically supported the approach because, not only did it made rural people potential shareholders of projects, but it also offered the prospect of better working relationships between IPPs and rural communities, with the potential for increasing social acceptance (Nepal Rastra Bank, 2020). The LES policy measure was later institutionalized into the constitution in 2010, and accordingly local people were entitled to a 10% equity stake in hydropower projects. Forty project companies are listed in the Nepal Stock Exchange as of 12/30/2021 (NEPSE, 2021), and many hydropower projects done by IPPs have adopted this approach. However, LES is applicable to only those private projects that have met set performance criteria and those that want to go public (Giri, 2016; SEBON, 2019). There are several private hydropower projects that have decided not to go public and there are completed projects that were unable to meet the criteria set by the SEBON, and consequently they are not listed. Additionally, there are some privately funded projects from India and China that have decided not to issue LES (NEPSE, 2021; Upreti & Associations, 2017).

Accessing capital for hydropower projects has been identified as one of the key challenges for the hydropower sector in Nepal (Wichelns, 2014). LES is meant to address the issue of raising cheap capital for the project company that would increase the internal rate of return for the investors. Private projects in Nepal are typically financed through debt: equity arrangement that can range from 60:40 to 80:20. Debt generally comes from local commercial banks and the equity is raised from offering shares and acquiring shareholders. However, the traditional lending practices of commercial banks in energy project financing was a big hindrance prior to LES. Piluwa Khola, a small hydropower project (3 MW), developed by Arun Valley Hydropower Development company in 2003, was the first private hydropower project to be financed by domestic banks. One of the key features of hydropower project financing in Nepal was the primitive level of understanding by the lending banks, apart from their low capital base and the lack of a unified hydropower finance guidelines (Sovacool et al., 2011). One of the principal covenants in the loan closure documents of these hydropower projects underscores that the promoters of the project would front-load capital. With the advent of LES in Nepal in 2010 and capital market reforms (SEBON), financial institutions in Nepal now have a better visibility of the sources of capital that helps them in planning for debt disbursement.

4.3 METHODS

The study identified key members of Independent Power Producers of Nepal (IPPAN) organization and collected data between July to December 2021 by using purposive sampling (Battaglia 2008). IPPAN is a non-profit organization that was established in 2001, and it works as a liaison between public and private sector to help facilitate hydropower development in Nepal by IPPs. There are 108 operational hydropower projects as of February 21, 2022 (DOED), of which

75 were commissioned after the 2010 regulation for local equity shares was announced. Of these, 43 hydropower projects have issued local shares to the project-affected people thus far (NEPSE). Not all IPPs are publicly listed. Some publicly listed independent power producers such as Butwal Power Company went public before 2010, prior to LES coming into effect, so they did not have to execute LES as part of their public listing process. Others deliberately chose not to go public (for example, Himal Power). Most of the foreign joint venture projects built with Chinese and Indian investors have not gone public (Lord et al., 2020). Finally, numerous hydropower companies that have poor credit ratings are also prevented from issuing public shares (SEBON, 2019, pp. 313–330).

Developers from each of the 75 IPPs were approached via IPPAN between July – November 2021; only 41 IPPs responded and only 30 interviews could eventually materialize. The study participants included both those whose projects included LES and those that did not. Primary data collection methods included online (zoom/ viber) semi-structured interviews with the directors (n=19) and senior executives (n=11) of IPP hydropower project companies. Interviews were conducted in Nepalese language and later transcribed; an English version of the interview questions is provided in the Appendix. The digitally recorded interviews were transcribed soon after completion of each interview. Memos and note-taking for each interview helped with initial analysis of the interviews. In addition to data collected through these interviews, data was collected from relevant academic, policy, and governmental reports (Archibald et al., 2019).

A thematic analysis (Guest et al. 2012) was used to assess data using NVivo and Delve. This followed a three-step coding process. In the first step (viz. open coding), each transcript (n = 30) was broken down into individual excerpts or snippets based on the interview questions. These snippets were compared and connected according to the newly created codes. In the second step

(viz. axial coding), newly created codes were compared followed by creation of different categories that connected the codes. The process followed an iterative process to review and refine the codes as I progressed through the interviews. In the final step (selective coding), the themes were further refined yield a core theme extracted by encompassing all other themes (Thornberg & Charmaz, 2014).

4.4 RESULTS AND DISCUSSION

The study identified three themes namely, mobilizing cheap capital, community relations, and profitability supports rural development, along with a core theme that encompassed the other three: sustainable return on investment.

4.4.1 *Core theme: Sustainable Return on Investment*

Sustainable return on investment is the core theme that touches on data within the study, while the analysis confirmed that it was connected to and under-pinned other themes. Hydropower developers in Nepal feel they must navigate through the nuances of 3 Cs: climate, capital, and communities, when building a hydropower project in Nepal's mountains. First, climate variables and climate change obviously have a bearing on the technical feasibility of hydropower projects in Nepal since most of the rivers are snow-fed in the country. Next, capital affects the ability of the investors and lenders to provide much needed capital for speedy construction of a project, and LES together with IPO provide capital at relatively low cost to the project. Finally, role of communities during construction and operation of the project is also crucial. The interviews suggest that private investors prioritized financial success of the project concerned.

Private investors have an interest in timely completion and unhindered operation of their hydropower projects because they need to be able to repay their debt to their lenders and return

dividends to their shareholders. This is done by getting the required buy-ins from local PACs so that the construction works and operation activities are not hindered. They would also want to minimize the cost of capital as much as possible because it directly affects the cost of doing business. While the upside of business revenue from a hydropower project is fixed because the price of electricity produced is locked for next 30 years as guided by the Power Purchase Agreement with Nepal Electricity Authority, the financial costs are highly significant. This is where LES can play a role in raising capital at low cost.

Study participants also felt that it would be beneficial for rural residents to see a project completed and operated successfully because of the indirect benefits as the state is able to increase its tax-base. Study participants believed that it could work in everybody's interest if a IPP project had adequate finances and was completed in time. Traditionally, such financing source was the commercial banking sector; however, as the number of projects grew over time, the banks in the industry were limited by the size of such exposure. The following statement by a study participant underscores this sentiment where the primary focus is on sustainability of the venture:

“LES is an arrangement that works for us in the current circumstances. As a hydropower project company that has a responsibility to ensure financial success of its project by raising enough capital at low cost and ensure unhindered operation of the project without much government support, this is a better option than other alternatives on the table – what are you going to do?”
(Proj 20)

Except for few hydropower projects in remote areas, most other hydropower projects that could have gone ahead with issuing shares to the PAC residents through LES. In many of the hilly regions of Nepal with varying number of households, most private hydropower projects felt that it was a matter of both legal compliance and practical approach of building good relationship with PACs to invite the rural residents to buy shares in the project. Many study participants felt that the law enshrined in the constitution was clear and it was up to the individual companies on how and

when to implement LES in their longer-term plan of bringing local communities on board and promote a feeling of ownership. More importantly, the study participants also highlighted that inviting local households to participate in LES was also an opportunity for them to raise the much-needed domestic capita, which not only reduced their dependency on commercial banks but also reduced average cost of capital thereby further improving the financial viability of the projects. Thus, the study participants implied that adoption of LES could improve the likelihood of financial success for hydropower projects. In the context of ensuring viability of their hydropower projects, most study participants who favored LES described it as structuring a win-win situation for both the project developers and rural communities, such as this statement:

“We basically wanted a situation where we could focus our resources and energy on building a good hydropower project rather than having to deal with social conflicts. In addition, we wanted a situation where we could get more support from capital market to raise finances for such ventures because the commercial banks were not too committed in financing hydropower business. Therefore, we can say that we adopted this option primarily to safeguard our interests” (Proj 17).

These sorts of statements seem to lack an appreciation for the complexities created by these private hydropower dams’ on human lives of the PAP, which runs counter to the recognition justice principle. This may indicate that private companies are not well equipped to handle community relationship with PACs. At the same time, the core theme highlighted how the private hydropower projects framed their attempts to promote community wellbeing, despite the projects being privately built and operated. There seemed to be a general belief among private investors that LES was a unique and cost-effective approach to raise domestic capital and it offered indirect support to local economy by allotting up to 10 percent of equity for local communities. However, at the same time there seemed to limited pushback among some private investors who questioned if they were stepping into government domain, such as this observation:

“In my perspective, most IPPs acknowledged the notion of supporting the local community’s development aspirations in some respect and they supported LES initiative because they

demonstrated awareness about how it was going to impact the community. However, in our case our board members were not so sure as to what extent private projects should get involved in the matters of community welfare because it is largely a government domain” (Proj 7).

4.4.2 Theme 1: Mobilizing Cheap Capital

LES has opened more doors for financing hydropower development in Nepal. A majority of the participants in this study reported that there was a positive sentiment about raising capital for projects through LES, as stated by this study participant:

“Raising at least 30% of our paid-up capital was our primary motivation so that we could pay off our creditors. Luckily, local equity share, and the initial public offering were fully subscribed” (Proj 11).

Many participants mentioned that their reason for initiating LES was to increase the viability of their business by generating more capital domestically. It seems that LES helped many hydropower companies mobilize up to 10% of the capital needed to construct a project, as described by this study participant:

“LES allowed us to quickly repay the loan of banks and financial institutions” (Proj 11).

However, not all study participants had hydropower projects that executed LES. It is noteworthy to mention that SEBON has guidelines that define the criteria for hydropower projects to be able to issue public shares and allocate common shares to the local public, which is highlighted in the credit rating of a project (SEBON, 2019). This study participant notes how SEBON’s credit rating rules influenced their project:

“We were not allowed to participate in the IPO process because of SEBON’s revised regulation; this reduced our ability to mobilize required capital for our project that has affected our business viability” (Proj 22).

This may affect both the PACs and private investors to meaningfully engage in the LES. Other IPPs decided not to incorporate LES because they had already secured sufficient external funding, such as mentioned by this study participant:

“We did not need any external financing, so we decided not to issue LES” (Proj 13).

LES also provided an opportunity for IPPs to help with financing as they scaled up their operations. Some study participants felt lucky because they had been able to successfully initiate LES and raised sufficient capital to invest in string of projects consistent with their long-term business plans. This excitement seemed to center around the fact that they were now able to fund expansion projects, as noted by this study participant:

“Our local equity share and initial public offering were both oversubscribed, and we were able to raise significant equity to invest in our cascade project. We invested that surplus capital to invest in the cascade project downstream, and we are rapidly making progress on that project” (Proj 07).

4.4.3 *Theme 2: Community relations*

Community relations between IPPs and project-affected rural communities is the idea that not only there is a connection between them, but also an acknowledgement that the former has the potential to play a significant role if they are to avoid social conflicts. One of the fundamental policy motivations in developing LES was to overcome social conflicts and build viable community relationships (Sharma et al., 2014). In this study, numerous IPP participants believed that LES was generally helpful in influencing the social acceptance of hydropower projects. Those who imagined that LES could be a tool for influencing social conflicts, at times found reasons to adapt their practices to respond to concerns from PACs, such as noted by this study participant:

“We had also allowed for one public director from the local constituents, and this has given us a chance to keep an open mindset about the issues that the local people may be sensitive about” (Proj 20).

However, there was no clear consensus. There were some from IPPs who were critical of facilitating greater representation by rural households because it could potentially lead to poorer community relations and more conflicts. Inviting rural residents as shareholders in IPPs also raised

issues for some study participants about how to manage expectations, such as this comment from a study participant:

“Frankly speaking it has not turned out well for us. We generally held hearing sessions the local shareholders during our annual events, and with each passing years, the expectations of the local households have grown, which is challenging at times” (Proj 25).

Winning the trust of local households is a major component of LES, however, there were different experiences and perceptions among the study participants about whether LES protects or exposes IPPs to social conflicts with rural residents.

4.4.4 *Theme 3: Profitability Supports Rural Development*

There was a clear consensus among the study participants about the importance of hydropower projects as agents of rural change in Nepal’s socioeconomic development. This echoes the assessment of multilateral financing agencies such as IFC who argue that LES is a win-win arrangement for both the private investors and local PACs. Nonetheless, this is a slightly misplaced notion to believe that LES would directly lead to welfare of the PACs because the private investors are primarily motivated by their desire to safeguard their investment and the benefit to individual participating households is a by-product of the whole arrangement. Thus, there were notable differences between study participants who wanted to help and those who thought it would be a risky proposition to be involved in rural development. Those who were positive viewed work on rural development as an opportunity to participate in the process of nation building and saw a role for themselves in this. However, some participants were ill at ease with rural development because these were uncharted waters in which they lacked expertise or because they felt that there were limits to what they could do, such noted by these study participants:

“We would like to participate in the process of rural development and nation building; however, we are more comfortable in supporting the welfare and charity-oriented activities that align with our company’s corporate social responsibility” (Proj 29).

4.5 CONCLUSION

Private hydropower projects in Nepal have faced dual challenges of mobilizing adequate capital for their project and mitigating social conflicts. Such challenges if not addressed adequately may pose risk for timely completion and operation of a project thereby affecting the financial viability of these infrastructure projects because they typically have a license period of 30 years. In case of Nepal, a novel approach to HBSA, LES, was crafted after dialogue with securities regulator, issue manager, and local communities that allowed these private projects to issue shares to rural residents in PACs. The primary idea was to help mobilize domestic capital without additional costs on one hand, and to build trust and promote transparency on the other hand. Thus, it was a pathway for more sustainable way of financing energy projects that can also allow for more equitable distribution of benefits and burdens for local households. Nepal adopted the LES program in 2010 and refined it thereafter to streamline the process. This study presents valuable insights into the experiences and perspectives of those in positions of leadership within IPPs with respect to LES as a financing model, an encouragement to restructure relations with project-affected communities, and an approach to rural development.

Findings in the study indicate that the study participants in IPPs were aware of the power of LES to influence their decision-making. Some study participants in IPPs found LES as a pathway to secure more capital so that they could repay their creditors and start new energy ventures thereby improving their business viability. On the other hand, other study participants were not interested in LES to secure financial capital, had too few households to make LES work effectively or were unable to meet the legal requirements to incorporate LES within their projects. Participants were

split on whether LES fostered community relations between IPPs and project-affected communities in ways that might create conducive environments for the future ventures of these project companies. Many, but not all, study participants believed that the IPPs that initiated LES would receive better benefits in the long run both in terms of social acceptance and increased capital infusion. This raises the question of what, or perhaps more importantly who, defines “better benefits”? For some, however, not participating in the LES was viewed as beneficial because this increased operational flexibility and decision-making about management of capital. In terms of rural development, there were contrasting positions, both about the viability of IPPs’ work on rural development being sufficient to replace the role of government and whether LES would simplify or complicate expectations around the role of IPPs in terms of rural development. This study was designed to clarify existing knowledge base on this interdisciplinary development topic. It highlights the need for more in-depth research about the potential outcomes of policies like LES in extractive industries considering the vulnerability of the local population.

Chapter 5. CONCLUSIONS

There has been substantial scholarly interest in the sustainability of water infrastructure in rural regions of developing countries in the Global South, especially due to ongoing climate change events and their impact on hydrology (Grey & Sadoff, 2007). But beyond the physical aspects, significant human dynamics are equally critical for success of such systems in the Himalayan region. In this vein, my dissertation addressed some significant questions about sustainability and rural development associated with private hydropower dams through research into HBSAs in Nepal. However, this research also reaches beyond the country into other parts of the Global South as well who are leaning on hydropower projects for energy security and economic development.

This dissertation examines three contemporary issues, each with its own chapter. First, it provides an analysis of equity issues and spatial considerations inherent in HBSAs that have been organized as a framework so as to be useful in different geographic regions. Second, research was done on the experiences and perceptions of rural community leaders in Nepal about the impact of LES for themselves and their rural constituents. Third, an assessment of the experiences and perceptions of private Nepalese hydropower developers about the impact of LES on domestic capital mobilization and conflict management with rural communities.

Chapters 2 through 4 tackle disparate issues that share a common feature: the role of different forms of HBSAs as policies aimed at equitable distribution of benefits and burdens arising out of hydropower dams. Each chapter explores the connections between one or more HBSAs with rural development and sustainability. Chapter 2 emphasizes how spatiality makes a difference in HBSAs when integrating considerations about feasibility and equity distribution in hydropower development decisions. Chapter 3 and 4 explore LES in Nepal as a new approach to HBSAs that offers the prospect of reducing social conflicts in hydropower sector and promoting

inclusive development with reduced government bureaucracy. Municipal equity sharing approach in Norway uses an identical functional form but links its approach to a monopolistically competitive government sector thereby adding structure to the delivery system. For instance, majority of power companies in the Gloma and Laagan river basin have local authorities as shareholders of equity and receive revenues in the form of dividends to the owners (Wang, 2012, p. 14).

An attractive feature of HBSA-Development analysis in Chapter 2 is that it allows different conceptual structures across different geographies, thus facilitating debates about how constructive engagement of and new alliances between rural households, private investors, and public agencies can help achieve sustainable development objectives of the region. For example, while the royalty sharing model may be more suitable in one country because of its administrative efficiency, while a development-trust model be more suitable another country or another region because this model involves more community involvement. The spatial framework of choice for capturing and separating the direct and indirect benefits accruing from hydropower projects is grounded in understandings about both feasibility and equities involved in benefit distribution. One of the takeaway lessons from Chapter 2 is that, although the concept of HBSA is a positive step in the direction of equitable distribution of hydropower cost and benefits, the majority of the HBSAs still follow the top-to-bottom legacy framework with limited provision of accountability, monitoring, and participation by the project-affect communities.

In Chapter 3, the impact of rural participation in LES is explored through a study of rural leaders and their experiences and perceptions with LES in privately developed hydropower projects in Nepal. These impacts are important because they are related to the role of HBSA/ LES both as a source of motivation to participate in the hydropower benefit distribution and as an engine

of rural development. The analysis reinforces the importance of households as the unit of analysis in rural development. In addition, many study participants reported benefits from their household or their constituencies' participation in LES, however, those associated with projects completed after 2015 generally tended to be more positive about LES. Results also indicate that, although hydropower project companies tend to compete for the water resources of rural Nepal, they still tend to choose potential sites that not too distant from urban core.

Chapter 4 examines the kind of impacts private hydropower investors' involvement in the LES have on the dynamics of social conflict and capital mobilization in the light of rural development. The number of private sector-led hydropower projects in Nepal has grown exponentially in the past decade, and it is likely that this sector will continue to be a significant force in coming decades because of the immense market potential for hydropower both within and outside Nepal. Private hydropower investors will have to pay attention to engage local rural households in dialogue and consent to their participation for successful completion and operation of their projects. It has often been observed in Nepal that LES helps mobilize domestic capital required for these projects. While the findings of this study do not undermine that claim, based on the study's findings there may be some avenues for improvement in LES. Many scholars doubt whether building private hydropower projects on national rivers is a sustainable pathway to move from the controversy of "water grabbing" and what should be the extent of rural households' role (Işlar, 2012). Narratives about the sustainability of rural development are at the core of this dissertation, including how to establish the significance of rural households as a spatial unit of study. If rural households are directly affected by hydropower projects or other extraction industry projects, then how can it be structured to insure they get their due share of benefits in a direct and timely fashion?

Future avenues for research would be to conduct more comprehensive analyses of householders' perception using greater coverage across Nepal, perhaps using a wider coverage of geographical area, using more participation, or applying a different research technique. Another avenue would be to examine the longitudinal analysis of socioeconomic outcomes in rural municipalities with and without participation in LES in Nepal. Finally, it would be valuable to study whether, how, and where refined versions of LES might be relevant for other countries in Global South.

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APPENDICES:**Appendix A: Semi-structured interview questions for Research Question 2**

1. What is your best estimate of households' participation in LES in your village? (<25%, 25-50%, 50-75%, > 75%)
2. What do you think are the households' primary motive/s to participate in LES? (i) Cashflow availability, (ii) Child's education, (iii) Asset building, (iv) Others (Diversification of livelihood). Why?
3. Which households in your rural municipality seem enthusiastic and which seem reluctant about participating in LES? (a) traditionally well-off households; (b) households with access to finance; (c) households with continuous remittance; (d) households with educated members; (e) other types of households?
4. In the past decade, what improvements have happened in the socioeconomic sphere such as for drinking water, electricity, child's education, access to health care facilities, better market access in your village/district? Have LES and hydropower projects played a role in this? If yes, how?
5. Has there been a shift in the community's perception towards participation in LES over past ten years?
6. Do you think local households in the community have more or less cash now? Has the district tax revenue increased or decreased?
7. What kind of information is available to households in your village about the LES?
8. Suggestion on LES: What can be done better or different?
9. Have you ever subscribed to LES? Yes/ No (Why)
10. Do you feel that your own participation in LES was successful? Why?
11. In what ways do you feel that the LES furthers rural development?
12. Do you have any other comments about LES that you would like to share?

Appendix B: Semi-structured research questions for Research Question 3

1. Which project(s) that you developed has issued LES and invited household participation?
(If not, then why not?)
2. Was your only motivation in implemented LES to meet the statutory guidelines? (Yes or No; if Yes, then jump to question 6; if No, then continue with the next 3 questions)
3. Were you motivated to implement LES to mobilize local capital to support the project?
Can you please elaborate further on this?
4. Were you motivated to implement LES to increase social acceptance of the hydropower project and/or mitigate local conflicts? Can you please elaborate further on this?
5. Were there any other motivations you had in implementing LES?
6. Were you able to raise sufficient equity?
7. Was each project with LES fully subscribed by local households?
8. Has each project with LES been able to provide returns or dividends to the local public shareholders? (Yes/ No) If so, how often?
9. Did project(s) face local opposition during the project construction? (Yes/ No) Which project(s)? What did you do in response? What was the impact? How is the situation now?
10. How would you compare raising capital for project development with or without LES?
11. If you have been involved in more than one project, how would you compare?
12. What are the challenges in implementing LES?
13. In what ways do you feel that the LES furthers rural development?
14. Do you have any other comments about LES that you would like to share?

Appendix C: Hydropower project listed in Nepal Stock Exchange and their last trading prices (LTP)

S.N.	Symbol	Company	LTP	As Of:
1	NHPC	National Hydro Power Company Limited	364.00	2021-12-23
2	BPCL	Butwal Power Company Limited	482.60	2021-12-23
3	CHCL	Chilime Hydro power Company Limited	505.00	2021-12-23
4	AHPC	Arun Valley Hydropower Development Company Limited	447.00	2021-12-23
5	SJCL	Sanjen Jalavidhyut Company Limited	352.50	2021-12-23
6	SHPC	Sanima Mai Hydropower Limited	408.00	2021-12-23
7	RHPC	Ridi Hydropower Development Company Limited	838.00	2021-11-03
8	RHPL	Rasuwagadhi Hydropower Company Limited	365.00	2021-12-23
9	BARUN	Barun Hydropower Company Limited	493.00	2021-12-23
10	UPPER	Upper Tamakoshi Hydropower Limited	637.00	2021-12-23
11	AKPL	Arun Kabeli Power Limited	520.10	2021-12-23
12	API	Api Power Company Limited	444.90	2021-12-23
13	MKJC	Mailung Khola Jal Vidhyut Company Limited	448.00	2021-12-23
14	DHPL	Dibyashwari Hydropower Company Limited	290.10	2021-12-23
15	NYADI	Nyadi Hydropower Company Limited	371.00	2021-12-23
16	NGPL	Ngadi Group Power Limited	629.00	2021-12-23
17	RADHI	Radhi Bidyut Company Limited	570.60	2021-12-23
18	KKHC	Khani Khola Hydropower Company Limited	295.00	2021-12-23
19	GHL	Ghalemdi Hydro Limited	335.00	2021-12-23
20	HURJA	Himalaya Urja Bikas Company Limited	411.00	2021-12-23
21	UMHL	United Modi Hydropower Limited	377.00	2021-12-23
22	AKJCL	Ankhukhola Hydropower Company Limited	291.00	2021-12-23
23	UPCL	Universal Power Company Limited	368.00	2021-12-23
24	NHDL	Nepal Hydro Developer Limited	419.50	2021-12-23
25	SPDL	Synergy Power Development Limited	418.10	2021-12-23
26	HPPL	Himalayan Power Partner Limited	420.00	2021-12-23
27	CHL	Chhyangdi Hydropower Company Limited	474.90	2021-12-23
28	RRHP	Rairang Hydropower Development Company Limited.	563.10	2021-11-03
29	SAHAS	Sahas Urja Limited	551.00	2021-12-23
30	JOSHI	Joshi Hydropower Development Company Limited	333.00	2021-12-23
31	MHNL	Mountain Hydro Nepal Limited	426.00	2021-12-23

S.N.	Symbol	Company	LTP	As Of:
32	<u>PMHPL</u>	<u>Panchakanya Mai Hydropower Limited</u>	326.00	2021-12-23
33	<u>UNHPL</u>	<u>Union Hydropower Company Limited</u>	326.00	2021-12-23
34	<u>KPCL</u>	<u>Kalika Power Company Limited</u>	530.00	2021-12-23
35	<u>PPCL</u>	<u>Panchthar Power Company Limited</u>	470.00	2021-12-23
36	<u>HDHPC</u>	<u>Himal Dolakha Hydropower Company Limited</u>	327.00	2021-12-23
37	<u>SSHL</u>	<u>Shiva Shree Hydropower Limited</u>	329.00	2021-12-23
38	<u>RURU</u>	<u>Ru Ru Jalbidhyut Pariyojana Limited</u>	893.00	2021-12-23
39	<u>GLH</u>	<u>Greenlife Hydropower Limited</u>	405.00	2021-12-23
40	<u>SHEL</u>	<u>Singati Hydro Energy Limited</u>	397.00	2021-12-23
41	<u>MEN</u>	<u>Mountain Energy Nepal Limited</u>	1,125.00	2021-12-23
42	<u>LEC</u>	<u>Liberty Energy Company Limited</u>	322.00	2021-12-23
43	<u>UMRH</u>	<u>United Idi-Mardi and R.B. Hydropower Limited</u>	516.00	2021-12-23
44	<u>TPC</u>	<u>Terhathum Power Company Limited</u>	430.00	2021-12-23
45	<u>SPC</u>	<u>Samling Power Company Limited</u>	436.00	2021-12-23

(<http://www.nepalstock.com/company>)

Appendix D: A Sample Credit Rating Report of a Private Hydropower Project



Buddhabhumi Nepal Hydropower Company Limited: [ICRANP-IR] BB- and [ICRANP] LBB-/A4 reaffirmed

March 7, 2022

Summary of rating action

Rated Limits* (NPR Million)	Previous Rated Amount	Current Rated Amount	Rating Action
Issuer Rating	NA	NA	[ICRANP-IR] BB-; reaffirmed
Long-term loans; fund-based	773.5	886.3	[ICRANP] LBB-; reaffirmed
Short-term loans; fund-based	-	20.0	[ICRANP] A4; reaffirmed
Short-term loans; non-fund based	(370.0)	(370.0)	
Total	773.5	906.3	

* Limit details are provided in [Annexure-1](#)

Rating action

ICRA Nepal has reaffirmed an issuer rating of [ICRANP-IR] BB- (pronounced ICRA NP issuer rating double B minus) to Buddhabhumi Nepal Hydropower Company Limited (BNHCL or the company). Issuers with this rating are considered to have moderate risk of default regarding timely servicing of financial obligations. The rating is only an opinion on the general creditworthiness of the rated entity and not specific to any debt instrument.

ICRA Nepal has also reaffirmed a long-term rating of [ICRANP] LBB- (pronounced ICRA NP L double B minus) and a short-term rating of [ICRANP] A4 (pronounced ICRA NP A four) for the bank loan limits of BNHCL including the enhanced limits.

Rationale

The ratings reaffirmation considers the low project execution risks for the 4.993-MW Lower Tadi Khola hydropower project (HPP) being developed by BNHCL with the project almost completed (~95-98% physical progress achieved till mid-February 2022). The ratings are further supported by lower evacuation risks, given the completion of the required NEA's evacuation structures (Samundratar sub-station and Samundratar-Trishuli 3B 132 kV transmission lines). The project being built on the higher probability of flow exceedance (~54% against 40% for most HPPs), with high dry energy mix (~23%) and high contract PLF (~73%) is expected to support the better energy generation to some extent. This coupled with relatively better hydrology of the river, supported by the long-term gauging data and partial snow-fed origin, is also expected to augur well for generation prospects. Additionally, the ratings also factor in the long-term power purchase agreement (PPA) with predetermined tariffs and escalations under the take-or-pay modality with Nepal Electricity Authority (NEA) (**Rated [ICRANP-IR] AA+**), which eliminates the tariff risk and offtake risk for the energy to be generated by the project.

Nonetheless, the assigned ratings are constrained by the relatively higher project cost of ~NPR 290 million per MW (escalated by ~22% since last rating) reflecting in moderate return and coverage indicators, given the fixed tariff regime. Given the higher estimated project cost, the generational efficiency of the project will be the key driver for the overall financial profile of the project and the company. Lower generational efficiency, especially in the initial years when the cash build-up is low, is expected to constrain the debt coverage indicators, necessitating further financial support (fresh borrowings or equity injection) by the promoters. Rating concerns also arise from the probability of shorter project economic life¹ for the company due to delayed commissioning of the project which could subdue the overall project returns. The ratings, further, remain constrained by the funding risks with financing gap of ~NPR 148 million (based on revised budgeted

(https://www.icranepal.com/wp-content/uploads/2022/03/156.-Rationale_Buddhabhumi-Nepal-Hydropower-Company-Limited_-Issuer-and-BLR-Surveillance-March-07-2022.pdf)

Appendix E: Selected Hydropower Projects

Project name	Country	Benefits
La Vuelta and La Herradura Hydroelectric Project	Colombia	CDM
Chaglla, 456 MW	Peru	Royalty or Revenue sharing model; 50% of the tax revenue remains with the central government, while the other 50% is divided according to the project's location between departmental (1/4) and district government (3/4) Voluntary CSR measures including promotion of local training, employment and business growth, and community development support.
Nam Theun 2 hydropower project, 1,070 MW	Lao PDR	Watershed management and livelihood restoration program for 30 years amounting to a financial support of \$31.5 million
Vishnugad pipalkoti hydro	India	Revenue sharing (1% of power generated is made available to PACs) Preferential rates (100KWh free electricity per month for 10 years to PACs) Community development funds (water supply, bus shelter, school welfare, plantation)
Trung Son hydropower project	Vietnam	CSR (access roads and bridges for communities)
Upper Cisokan pumped storage power project	Indonesia	Revenue sharing and local employment
Bujagali hydropower project	Uganda	Development Fund (primary health care, water supply, education, training and sanitation) Local employment
Bumbuna hydroelectric project	Sierra Leone	Watershed management (protection sedimentation, improving livelihood of farmers, fisheries) Revenue sharing with Development trust
Upper Hewa A hydropower	Nepal	Revenue sharing (50:50 royalty to be shared between federal government and district)

Appendix F: Process of Local Equity Share Execution and Agencies Involved

