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Impacts of Hydropower Development on Natural Resource Accessibility and the Livelihoods of Local People: The Case of Quang Nam Province in Vietnam

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Abstract

The hydropower system in Vietnam has been crowdedly built on river basins in the country. Because it offers economic benefits and energy for industrial growth, the social and environmental impacts of hydropower are of great interest to scientists, governments and other stakeholders. This paper analyses its impacts on affected people in both resettled upstream communities and on downstream areas. Findings show that inadequate compensation and poor resettlement policy as well as an absence of post-resettlement policies thrust unfortunate circumstances on people resettled to upstream sites, such as loss of accessibility to natural forests and land resources, and loss of livelihood activities. Resettled communities upstream are often pushed into poverty, and experience unemployment, gender inequity and major cultural shocks. Also indicated are the negative impacts of hydropower development on downstream areas. Water storage in reservoirs during the dry season causes water shortage for cultivation and daily activities in downstream areas. Conversely, sudden water discharges with little warning also cause serious flooding and inundation in downstream sites. As a result, both in the dry and flooding seasons, cultivation and other livelihood activities of the local people are interrupted, and they face increased costs, and losses and damage to housing, etc. Gaps in water law and compensation policies were identified, which were the cause of the negative social impacts of hydropower projects. Trade-offs of hydropower development included unsustainable and inequitable development. Findings draw attention to the urgent need for stakeholders to correct hydropower development strategies in Vietnam.

Keywords: compensation, hydropower, livelihoods, natural resource access, water governance

Biography

Pham Thi Nhung is a young lecturer at Faculty of Extension and Rural Development, Hue University of Agriculture and Forestry (HUAF). She teaches subjects which are the sustainable livelihood analysis and natural resources management. She graduated a bachelor's degree of rural development from HUAF in 2006, and a Master's degree of natural resources management from Asian Institution of Technology (AIT) in 2012. At present, her research focuses on sustainable natural resources management, sustainable livelihoods for the poor and climate change adaptation in Vietnam.

Introduction

Harnessing water as an energy source through the construction of dams and hydropower projects has been very popular the world over since the 19th century. By the end of the 20th century, there were over 45,000 large dams in the world, built across 140 countries.[1] Hydropower plays an important role in not only energy production but also flood control and agricultural drainage.[2] It uses the movement of water to generate electricity without fossil burning, and therefore releases very low emissions into the environment.[3] In the context of global warming, hydropower was considered a safe solution for the world's energy requirements and has been recognised as a clean development mechanism that uses natural resources.[4]

With many river systems, hydropower development has been integral to Vietnam's economic development strategy. Until 2014, Vietnam has pursued about 450 hydropower projects, with 268 projects already generating electricity.[5] Nearly 40 per cent of hydropower projects were allocated to central Vietnam and the Highlands.[6] According to the government's electricity development plans up to 2020, hydropower will contribute 23.1 per cent of the country's electricity supplies.[7] Where Vietnam is concerned, hydropower development is not only a good solution for its energy requirements but also helpful in regulating stream flows, and controlling floods and droughts in downstream areas.[8]

However, hydropower development is not easy and simple. In addition to technical issues related to construction and operation, it is closely associated with displacement and resettlement of affected populations. Dam construction has been a major cause of involuntary resettlement.[9] Around the world, until the end of the 20th century, about 80 million people had been displaced by dam development.[10] Resettlement leads to changes in the accessibility of natural resources as well as the lives of affected people.[11] Access to natural resources clearly impacts livelihood

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[1] International Centre for Environmental Management (ICEM), 'Strategic environmental assessment of
[2] World Commission on Dams (WCD), 'Dams and development: A new framework for decision-making' (London: WCD, 2000), 39–41.
[3] Renewable Electricity Futures Study: Executive Summary, Mai, T.; Sandor, D.; Wiser, R.; Schneider, T (2012). Renewable Electricity Futures Study: Executive Summary. NREL/TP-6A20-52409-ES. Golden, CO: National Renewable Energy Laboratory.
[4] World Commission on Dams (WCD), 'Dams and development', op. cit.
[5] Pham Nhi Thung, 'Gains & losses of hydropower development for resettled communities', *The S. Rajaratnam School of International Studies (RSIS) Non-Traditional Security Studies (NTS) Blog*, 13 June 2014, *https://ntsblog.wordpress.com/2014/06/13/gains-losses-of-hydropower-development-for-resettled-communities/*.
[6] International Centre for Environmental Management (ICEM), 'Strategic environmental assessment of the Quang Nam province hydropower plan for the Vu Gia-Thu Bon River basin' (prepared for Vietnam Ministry of Environment and Natural Resources [MoNRE], Vietnam Ministry of Industry, Electricité du Vietnam, and Asian Development Bank [ADB], Hanoi: ICEM, 2008).
[7] Nguyen Huy Hoach, 'Vietnam hydropower – Current situation and development plan' (United Nations Framework Convention on Climate Change [UNFCCC], 2012).
[8] International Centre for Environmental Management (ICEM), 'Strategic environmental assessment of the Quang Nam province hydropower plan for the Vu Gia-Thu Bon River basin', op. cit.
[9] Cecilia Tortajada, 'Environmental sustainability of water projects' (Doctoral thesis, Stockholm: Royal Institute of Technology, 2001).
[10] World Commission on Dams (WCD), 'Dams and development', op. cit.
[11] ADB, ADB's Involuntary Resettlement Safeguards. 2007, *http://www.adb.org/Documents/Evaluation/Learning-Curves/SES/LC-Involuntary-Resettlement-Safeguards.pdf*.

strategies, and therefore diversifying natural resource access during resettlement can provide people with an exit route from poverty.[12]

In Vietnam, about 500,000 people have been resettled due to hydropower construction.[13] According to the planning report of the Quang Nam Provincial People's Committee (PPC), 42 hydropower projects have been approved in this central province of Vietnam, contributing to 7 per cent of the country's electricity supplies.[14] This has led to over 37,000 affected persons, and the inundation of 20,000 hectares (ha) of land, including forests, cultivation land and building land.[15]

For the affected people, hydropower development entails both difficulties and opportunities with regard to natural resource access and livelihood development. Identifying these difficulties and opportunities is a necessary step in planning for hydropower development, especially for the sustainable use of natural resources. This study assessed changes in natural resource access and livelihoods of affected people who were resettled to upstream areas as well as those in downstream communities in the Quang Nam province subsequent to hydropower development. It also analysed limitations of policies associated with hydropower development for water use, resettlement and compensation.

Overview

Hydropower projects and resettlement

Involuntary displacement is a process in which people have to move from one place to another due to natural disasters, environmental degradation, conflicts or development projects.[16] It involves processes that are meant to assist displaced people replace their housing, land, assets, livelihoods, access to resources and services, as well as restore their socioeconomic and cultural conditions.[17] Involuntary displacement and resettlement are complex processes that affect not only the displaced group but also the host communities to which affected people relocate. It impacts all aspects of the resettled host communities, be it their economy, society, environment or health.[18]

Vietnam government allows three resettlement types, including alternating resettlement, concentrative resettlement and free resettlement. Alternating resettlement means affected people will move on to host communes and stay alternately with native people. Concentrative resettlement means all affected people will move on and live separately alongside natives at host communes. In free

[12] Frank Ellis and Edward Allison, 'Livelihood diversification and natural resource access' (LSP Working Paper 9, UK: Livelihood Support Programme [LSP], Food and Agriculture Organization of the United Nations [FAO], 2004).
[13] Tuyet Thi Dam, John D. Pisaniello and Roger L. Burritt, 'Small dams: A big cause for concern in Vietnam', *International Water Power and Dam Construction*, 20 May 2011, *http://www.waterpowermagazine.com/features/featuresmall-dams-a-big-cause-for-concern-in-vietnam/*.
[14] PPC (Quang Nam Provincial People Committee), Báo cáo già soát phát triển đập thuỷ điện ở Quảng Nam (2012).
[15] Ibid.
[16] World Bank (WB), 'Involuntary resettlement' (2011), *http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALDEVELOPMENT/EXTINVRES/0,,menuPK:410241~pagePK:149018~piPK:149093~theSitePK:410235,00.html.*
[17] Ibid.
[18] Nga Dao, 'Dam development in Vietnam: The evolution of dam-induced resettlement policy', *Water Alternatives* 3, no. 2 (2010): 324–40.

resettlement, affected people can move on and live anywhere they are accepted by local authorities. However, the most popular type of resettlement in Vietnam is concentrative resettlement, as it is the easiest and most preferred by affected people.[19]

Livelihoods and access to natural resources and policy

> A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. An individual's livelihood is considered sustainable when it can cope with and recover from stresses and shocks, and when the individual can maintain or enhance his or her capabilities and assets without undermining the natural resource base upon which the individual's livelihood depends.[20]

Clearly, natural capital is very important to those who derive all or part of their livelihoods from resource-based activities (such as farming, fishing, non-timber forest products, mineral extraction, etc.). Its importance goes way beyond this, however. None of us would survive without the help of key environmental services and food produced from natural capital (such as, good quality air, clean water, etc.). Humanity depends on such natural resources, the links between them and the continued functioning of complex ecosystems (which are often undervalued until the adverse effects of disturbing them become apparent). Degrees of access to natural resources can be directly equated with degrees of vulnerability.[21]

Communities resettled upstream and hydropower construction

In terms of the physical conditions of resettled areas, infrastructural facilities, such as transport systems, medical centres, schools, commune houses and markets, receive early attention from the government before people being resettled. These involve technical and financial hurdles that investors are able to solve easily. Indeed, with cash received as compensation during resettlement, many households were found to have bought assets, such motorbikes, refrigerators, fans and telephones,[22] and 80 per cent of resettled people were satisfied with the infrastructure at the new place.[23]

However, several other problems confront people following resettlement. In some resettled areas in the high hills, water supply was problematic, so that, in the dry season, there was no water and people spent nearly three hours daily for water collection.[24] Almost all affected people lacked sufficient land for cultivation purposes. Resettled areas in Kon Tum province were a typical example, where investors only reclaimed 9 ha of land although there were 800 households in need of resettlement. As many as 64 households are yet without productive land.[20] Most projects did not allocate sufficient land for a number of reasons that include: (i) failure to correctly assess the number of affected people; (ii) the average land area allocated being too small; (iii) soil being of poor quality; and, (iv) slope gradients being too steep. Many people either do not get land or receive parcels that cannot be cultivated (for

[19] Ibid.
[20] Ellis and Allison, 'Livelihood diversification and natural resource access', op. cit.
[21] Ibid.
[22] Nhung Pham Thi, 'Changing of livelihood and natural resource accessibility in resettlement area, Thua Thien Hue province' (Pathumthani: Asian Institute of Technology [AIT], 2012).
[23] Nga, 'Dam development in Vietnam', op. cit.
[24] Bich Ngoc, 'Nan giải tái định cư thủy điện', *Tinmoi*, 1 May 2011, *http://www.tinmoi.vn/Nan-giai-tai-dinh-cu-thuy-dien-01517198.html.*

instance, during resettlement due to the Ban Ve and Pleikrong hydropower projects).[25] Almost all resettled areas were located far from natural forests, so that people no longer had access to forests, other natural resources and communal lands.[20] This is important, as studies have shown that prior to the construction of dams, 75 per cent of household incomes in affected areas are often based on forest exploitation.[21] Therefore, for affected people, natural capital is strongly reduced and no longer generating income.

Livelihood activities are badly affected following resettlement due to dam construction. Quality of life for affected people in resettled areas tends to decline, with no income other than the support received from investors, which is typically limited to 8 kg rice/person/month during the initial years. Some resettled areas lack food for as much as 6–8 months in a year.[26] Japan International Cooperation Agency (JICA), on studying the resettled areas of the Yaly dam, found that many families faced serious food shortage, especially among the ethnic minorities, as they were no longer able to make a living by selling grain by exploiting forest resources as before resettlement. In case of the Ta Trach reservoir resettlement, severe food shortages occurred in spite of government support in the form of food supply during the initial six months; many households had to borrow rice and take out loans, with some older people even having to beg.[27] According to Hoa Binh Union of Science and Technology, Vietnam, although the Hoa Binh hydropower projects were constructed nearly 30 years ago, the life of affected people has not improved and livelihood activities continue to be based on agriculture, such as food crops and livestock.

In addition to material support (such as money and food), resettlement programmes also involved training courses for affected people on agricultural production and livelihood adaptation. However, the content of such programmes either did not reflect the actual needs of people or were not applicable to the resettled area. Furthermore, as nearly all affected people were ethnic minorities, they were unable to learn new techniques or livelihoods. As a result, many were not able to adapt to the new place; some stayed on at the resettled area with many difficulties and hoping for support from stakeholders while others returned to their original regions to cultivate land that had not been inundated or to exploit forests illegally.[28]

Downstream communities and hydropower projects

Downstream communities were all communities allocated land downstream from the dam that live along the river and directly depend on its water sources. Most downstream communities have not received support or been compensated by investors in hydropower projects because they are not directly affected by it. However, a case study of Dak Lak province showed that daily fluctuation in water levels due to water release from the dam causes floods and soil erosion for downstream areas in both the dry and rainy seasons.[29] In the dry season, water from upstream areas is stored in the dam and consequently farmers in downstream areas do not have enough water for irrigation purposes and daily activities. Fish stocks too

[25] JICA, Báo cáo đánh gía tác động của di dân và tái định cư do tthuỷ điện ở Việt Nam (2003).
[26] Ủy Ban Nhân Dân (UBND), 'Hội thảo cộng đồng về dự án hồ tả trạch có sự tham gia của người dân tại T.T Huế', Ta Trach Project (2003).
[27] Nhung Pham Thi, 'Đánh giá sự thay đổi các hoạt động tạo thu nhập của hộ tái đinh cư tại xã Bình Thành huyện Hương Trà tỉnh Thừa Thiên Huế' (Hue City: Hue University, 2006).
[28] Nhung, 'Changing of livelihood and natural resource accessibility in resettlement area, Thua Thien Hue province', op. cit.
[29] Long Chau Thi Minh, 'Impacts of hydropower on downstream communities: A case study in Srepok River' (LAP LAMBERT Academic Publishing, 2013).

have declined due to these fluctuations in water levels. Similarly, studies of downstream sites in the Mekong River also concluded that fish stocks decreased by 40 per cent when hydropower projects on the river operate.[30] These projects also lead to inundation in the Delta, coastal erosion and increasing salinity, harming agricultural production and forcing farmers to migrate to other places. Income and livelihood activities of the local people gradually decreased and they were more vulnerable than earlier.

Thus, the negative impacts of hydropower projects on resettled upstream communities and on downstream areas expose the local people to various difficulties, including unequal water access.

Institutional Frameworks for Resettlement in Vietnam

Decree 22/1998/ND-CP on compensation

Decree 22/1998/ND-CP has replaced Decree 90/CP 1994, which defines resettlement-related issues for large infrastructural projects in Vietnam. Land for compensation is defined as land for common purposes, and the principle of 'land for land' is applied. The resettled areas should be 'suitable' for urban and rural planning criteria for construction purposes. Infrastructure, such as roads, electricity systems, schools and health stations, should be made available at these sites before they are transferred to resettled households and individuals. Some aspects of the decree are specifically relevant to people affected by hydropower projects.

Articles in the decree stipulate that cultivated land lost should be compensated by an equal or bigger amount of land for cultivation in the resettled areas. In cases where project affected persons (PAPs) received less land than they had access to previously and/or land of lower quality, the difference was to be compensated as cash at prevailing rates. Each household would receive between 400–1,000 m^2 of land for the house and domestic garden, with additional cash compensation provided if the household received less and/or lower quality land than they owned previously. All legal documentation regarding the transfer of land rights was to be handled and passed on to PAPs without any charge. All households would be provided with sufficient quality drinking water. Affected people have the right to electricity access. In areas where the national electricity grid passes in the vicinity of the resettlement, connecting the community to the grid would occur quickly. Should this not be the case, alternative electricity supply – small hydropower projects, for instance – would be made available. The provision of healthcare and education to resettled people is prioritised.

Water Law in Vietnam

In Vietnam, the Water Law was created in 1998 and upgraded in 2012. Water Law regulates water use and exploitation, and the responsibility and authority of the user, owner and other stakeholders. Article 43, point D, regulates the financial responsibility of the user and stipulates that the user has to compensate for all damages caused by their use and exploitation of water. Article 44, item 1, regulates water use for agricultural production, small enterprise, daily activities and emergencies (such as, fire control and disease control), which do not need to obtain use certificates. Articles 47 and 53 regulate the responsibility of the water user for

[30] Christopher G. Baker, 'Dams, power and security in the Mekong: A non-traditional security assessment of hydro-development in the Mekong River basin' (NTS-Asia Research Paper No. 8, Singapore: RSIS Centre for Non-Traditional Security [NTS] Studies for NTS-Asia, 2012).

hydropower and dam construction. Users have to: (i) ensure minimum water flow in the river basin and fish migration; (ii) obey plans made for water regulation and distribution by authorities to limit negative impacts on upstream and downstream areas, especially in the dry and flooding seasons; and, (iii) communicate with local people living around the dam.

Article 2, chapter 1, Decree 201/2013/ND-CP on Water Law, states that water use and exploitation projects by individuals or organisations that affect local people have to obtain the consent of communes and other stakeholders with regard to water use, exploitation, discharge and storage schedules. The projects are also responsible if water exploitation, discharge and storage leads to damage for local people. However, the law does not clearly consider compensation levels for such damages. Compensation is to be identified in case of damage at a meeting of all stakeholders.

Property rights and access to natural resources

Property rights. Property rights or 'tenure' refers to access to and control over resources of individuals, groups or organisations. Property rights status provides information on who claims what rights to which resources, who has access to land and associated natural resources, and who is responsible for managing the land.[31]

Bundle of property rights. These rights are classified to authorise users to use, manage and transfer land and various natural resources on it.[32] A bundle of rights comprises a set of rights that may include the right to use a resource, the right to manage it, and the right to transfer (assign or reassign) management and use rights.[33]

Property rights typically denote use rights that define who can use a resource, in what ways and in what amounts. These can be the non-consumptive uses of sources; or, the withdrawal (exploitation) of these sources, such as the collection of dead wood from a forest, grazing livestock in a pasture, fishing in a pond, or cultivation on land.[34]

Management rights are higher than use rights but lower than transfer rights. Management rights include the right to organise, monitor and assign use rights. This means that the manager of a unit of natural resources has authority to introduce, decide, regulate and manage use right holders.[35] Transfer right is a right of a higher order than management and use rights. They refer to the right to assign or reassign management rights, as well as use rights. The transfer may include all rights included in the property rights bundle.

Schlager and Ostrom argue that property rights include access (the right to enter a defined physical property), withdrawal (the right to withdraw the product of the property), management (the right to regulate internal use and make improvements in the resource), exclusion (the right to determine who will have an access right, and

[31] Safia Aggarwal and Kent Elbow, 'The role of property rights in natural resource management, good governance and empowerment of the rural poor' (Washington, D.C.: United States Agency for International Development [USAID], 2006).
[32] Sir Henry Sumner Maine, *Ancient law: Its connection with the early history of society and its relation to modern ideas*, 1st ed. (London: John Murray, 1861).
[33] Aggarwal and Elbow, 'The role of property rights in natural resource management, good governance and empowerment of the rural poor', op. cit.
[34] Ibid.
[35] Ibid.

how that right may be transferred to others) and alienation (the right to sell or lease the collective choice rights of management and/or exclusion).[36] Proportionate to these elements are positions such as authorised users, claimants, proprietors and owners.

Property rights regimes. 'Property rights regimes' constitute arrangements among stakeholders, institutions and social regimes to protect, maintain and use reasonably a natural resource.[37] For Bromley, property rights regimes could be categorised into four groups: private property, common property, public property and open access.[38] Private property occurs when the strands of the property rights bundles are held by a legal person whereas common property exists where property rights are shared among members of a community or association. Public property is established when the strands of the bundle are concentrated, held and managed by the government. Open access occurs where either no specific rights to land or natural resources have been assigned or claimed by holders. These property right regimes can occur at the same time in a natural resource system or a specific resource because these regimes are built based on characteristics of resources.[39]

Right holders. Based on the above property rights regimes, there are right holders in proportion. In Vietnam, the state owns all natural resources, and 'builds' property rights for other users according to local customs or state institutions.[40]

The identification of access and control of land and natural resources should ideally play an important role in the rehabilitation and development of sustainable livelihoods for resettled communities, but rarely do such rights meet peoples' subsistence needs, including that for shelter and food. In other words, access to natural resources (renewable natural resources, in particular) is a critical factor in reducing poverty and ensuring food security.

Methodology

Study site

The Vu Gia-Thu Bon River basin in the Quang Nam province is short and steep, with narrow valleys, steep riverbanks, and many waterfalls and rapids. In the middle reaches, the riverbed widens and shallows, and downstream the riverbanks become low, allowing overflow into fields and 219 villages during the flooding season. The Vu Gia-Thu Bon system has two main rivers – the Vu Gia and Thu Bon rivers. The Vu Gia River has many tributaries, the most significant being the Dak Mi (or Cai River), Bung, A Vuong and Con rivers. The length of the Vu Gia River to its mouth in Da Nang province is 204 km. The Thu Bon River is shorter than the Vu Gia River and only one hydropower project (Song Tranh 2) has been built on it since 2007 (Figure 1).[41]

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[36] Edella Schlager and Elinor Ostrom, 'Property-rights regimes and natural resources: A conceptual analysis', *Land Economics* 68, no. 3 (1992): 249–62.
[37] Truong Van Tuyen, 'Fishery management, fishing rights and rights allocation for a pilot co-management in Tam Giang lagoon, Vietnam' (Ottawa: International Development Research Centre [IDRC], 2009).
[38] Daniel W. Bromley, ed., 'Making the commons work: Theory, practice, and policy' (San Francisco: ICS Press, 1992).
[39] Tuyen, 'Fishery management, fishing rights and rights allocation for a pilot co-management in Tam Giang lagoon, Vietnam', op. cit.
[40] Ibid.
[41] International Centre for Environmental Management (ICEM), 'Strategic environmental assessment of the Quang Nam province hydropower plan for the Vu Gia-Thu Bon River basin', op. cit.

Figure 1: Hydropower system in Vu Gia-Thu Bon River basin and Tra Bui and Dai An communes.

Source: Quang Nam DORNE (2011),[42] based on ADB (2006)[43] and Pham Ba Huyen (2009).[44]

A report from Bac Tra My District's People's Committee (DPC) in 2013 found that, to build the Song Tranh 2 hydropower project (capacity 125 MW), 834 households with 4,369 people were resettled upstream in 2006 – 421 households were offered free resettlement, 413 households had concentrative resettlement in three communes (including Tra Bui, Tra Giac and Tra Doc) in the Bac Tra My district, Quang Nam province.[45] These communes were allocated upstream of the Song Tranh dam. For this study, the upstream resettlement area in Tra Bui commune was selected to represent communities resettled to upstream areas, as it was the most difficult and biggest area resettled upstream (totally 353 resettled households with 1,706 persons) for the Song Tranh 2 hydropower project.

Since 2012, the Song Tranh 2 hydropower project has been officially operational, and all communes downstream from the Song Tranh dam (in the Dai Loc, Dien Ban and Duy Xuyen districts) have been affected due to water discharge and storage during the dry and flooding seasons. Among these, communes in the Dai Loc district that were allocated land along the Thu Bon River have been clearly affected. The Dai

[42] Quang Nam DORN, The Gia Vu Thu Bon Basin. Basin profile prepared by Department of Environment and Natural resources, Quang Nam province, under project "Managing Water in Asia's River", ADB RETA6470 (2011).
[43] ADB, Song Bung 4 Hydropower Project Phase II (TA 4625-VIE). Final report of TA Advisor. 2006, *https://www.adb.org/sites/default/files/project-document/74345/36352-vie-eia-vn.pdf.*
[44] Pham Ba Huyen, Hydropower development potential in the Gia Vu –Thu Bon river system, presentation at the 6th NARBO IWRM training, Da Nang, By Quang Nam Industry and Trade Department (2009).
[45] DPC (Bac Tra My District People Committee), Báo cáo về tình hình đời sống nhân dân tại các khu tái định cư công trình thuỷ điện Sông Tranh 2, huyện Bắc Trà My (2013).

An commune in the Dai Loc district, which is along Thu Bon River, was selected as the downstream site for the present study. The main livelihood activity of local people in Dai An is agricultural production, especially vegetable farming.

Methods

The primary focus was 'before' and 'after' comparison to evaluate the impact of resettlement on PAPs, which focused on changes to livelihood activities and access to natural resources as experience by communities resettled to upstream areas and those downstream to the hydropower project.

Conditions prior to the construction of the dam were derived from an already gathered dataset, comprising data on area, types and quality of land, forest and water; property rights and resource access rights; and, income, income-making activities, labour, work times and livelihood assets of people before and at the time of resettlement.

To explore contemporary conditions, rapid rural appraisal (RRA) was used. RRA includes guidelines and tools that help people to work in a structured but flexible manner in rural communities. Tools of RRP support communication and interaction with these communities efficiently. Researchers can use these tools to collect data and arrive at answers to research questions clearly. The participatory techniques of RRA help researchers avoid setting their own objective ideals into the research, a situation that often occurs when using traditional approaches. The techniques that are used in this research included resource mapping, problem trees, seasonal calendars, focus group discussions (FGDs), semistructured interviews, observations and ranking.

Data collection and analysis. Primary data were derived from key informant interviews, household surveys (30 households in Tra Bui commune), mapping and resettlement area inventories, FGDs (two groups in Tra Bui commune; one group in Dai An commune), and stakeholder meetings. Secondary data was collected from internet-based sources; reports from commune, district and provincial offices; reports on the Song Tranh compensation and resettlement programmes; and, sources in the literature.

Problem tree. To identify the main causes behind the negative impacts of hydropower development for both resettled upstream communities and those in downstream areas, a problem tree was drawn during the stakeholder meetings at the Tra Bui and Dai An communes.

Findings

Impacts on communities resettled upstream

Changes to natural resource access. Relocation involved difficult changes in terms of natural resource access for the PAPs (Table 1). Lack of land for cultivation, difficulty in accessing water and loss of forestlands were key issues. The average compensated land area for resettled people was not equal to or larger than their earlier holdings, as regulated under Decree 22/1998/ND-CP on compensation. In fact, it decreased from 1.5 ha/household before relocation to 0.1 ha/household after the exercise. Soil quality was bad, with high slopes, so that compensated land was largely not cultivatable. While the decree stipulates compensation in such circumstances, in reality, compensation has been delayed and households have only received land to build houses on. This situation is not different from that of other

resettled areas associated with hydropower project construction in the country. The main reasons include the resettled area being too small, investors not keeping their end of the deal, and dam construction and hydropower project operation being allowed to continue without intervention from the government. This demonstrates that mistakes and weaknesses earlier associated with the land compensation process in dam construction and hydropower projects continue to exist and have been repeated at the Tra Bui site as well.

Table 1: Changes in natural resource accessibility for people resettled upstream.

Aspects of accessibility	**Natural resource**		
	Land	**Water**	**Natural forest**
Scale			
Before resettlement	1.5 ha	Unlimited	Unlimited
2013	0.1 ha	Limited	No access
Quality (range, 1–4)*			
Before resettlement	1	3	3
2013	4	2	-
Access rights			
Before resettlement	Exclusion	Withdrawn	Withdrawn
2013	Alienation	Withdrawn	No access
Length of access time			
Before resettlement	Not identified	Year around	Unlimited
2013	50 years	8–10 months a year	No access
Property rights regime			
Before resettlement	Private property	Commune property	Commune property
2013	Private property	Commune property	-

ha = hectare
* Where, 1 = very good quality; 2 = good quality; 3 = bad quality; 4 = very bad quality.
Source: Data gathered during group discussions at the upstream Tra Bui commune, 2014.

However, land use rights for the people had improved – 100 per cent of households had land use certificates, access rights changed from exclusion to alienation and the length of access time amended as 50 years, all of which was officially recognised by the government. Prior to resettlement, although all people reclaimed and used land for cultivation and building houses, their land use right was not recognised by the government. This was the only positive finding with respect to land compensation following resettlement. However, for PAPs, the legal aspects of land access were only important for the purposes of selling land. All interviewees considered as important other aspects, such as land area and quality, instead. For this reason, PAPs continued to feel that land access remained poor at the resettled areas.

Common pool resources are resources to which no individual had exclusive rights, such as fisheries, reefs, forests and pastures, and waterways. They are typically administered and owned by the social group, a village or state. Benefits from access

to these resources are shared among the commune members or group instead of by an individual or person.[46] Studies have shown that, during the past decades, household income from natural forests in mountainous areas has gone up from 15 per cent to 25 per cent; this rate is higher among poor people, at 29 per cent.[47] These findings highlight the importance of livelihood options for the community. Common pool resources in resettled areas focus on water and natural forests.

Where access to water is concerned, in the old areas, the river was near and the water supply unlimited, easily and conveniently accessible for daily and livelihood activities. In the resettled area, on the other hand, which was located in mountainous terrains without small lakes or natural irrigation canals, water for daily activities as well as for cultivation was entirely dependent on sources such as mountain creeks. During the dry season, water became even scarcer for 2–4 months every year. However, there was improvement in water quality as some water storage basins, that stored water from the mountain creeks, with filtration devices were built in the resettled areas by investors. Nearly 10 households accessed such a communal basin for daily activities alone free of charge although they were required to save and protect the water source for their community. All interviewees were satisfied with the good quality of water but confounded by its scarcity, especially during the dry season. Many people had come to recognise the importance of water accessibility since relocation.

Hydropower construction caused the loss of about 1,200 ha of forestland, including planted and natural forest areas. Unlike before, in the resettlement areas, people were legally unable to access and extract non-timber forest products. Not surprisingly, at FGDs, PAPs stated that their biggest loss had been the loss of access to forests, affirming that natural forests not only were an important income source but also of cultural and spiritual value in their lives. In other words, the loss of natural forest accessibility was as much a loss of income as that of quality of life.

Findings suggest that common pool resource accessibility, while valuable, had strongly decreased since resettlement. However, Decree 22/1998/ND-CP on compensation is not concerned with compensation for such losses or changes in water and natural forest accessibility. In effect, despite real losses for PAPs, there is no compensation offered or received. As Ellis suggests, these impacts negatively impact the living standards of people in resettled areas.[48]

Changes in income-generating activities. Livelihoods in resettlement areas are unstable, as people have to adjust to changes in living conditions. Also, the diversity of income-generating activities is often less than before resettlement. Data from the household survey showed that almost all households earned income from diverse sources, such as cultivation, forest exploitation, husbandry, planted forest and wage labour, prior to relocation. However, at the resettled area, wage labour was the only income activity. Wage labour – with 81 per cent of labourers working for landowners involved in the logging of planted forests and reforestation – was temporary, unpredictable, seasonal, and without labour contract or insurance policy. The remaining 19 per cent of labourers went to cities and worked in industrial zones. Animal husbandry (such as, raising hens and pigs) was another activity that nearly 20 per cent of households were engaged in on a small scale. Livestock production was, however, engaged in more to meet the family's food demands than as a source of income.

[46] Bromley, 'Making the commons work', op. cit.
[47] CODE, Gia phai tra cho thuy dien khong re' (Place: Condeiner, 2010), *http//codeinter.org*.
[48] Ellis and Allison, 'Livelihood diversification and natural resource access', op. cit.

The average number of workdays employed as labourers in a year decreased from 200.5 days to 120 days, so that average annual income per person fell from Dong 4.2 million before resettlement to Dong 2.67 million after relocation. According to the Tra Bui Commune Peoples Committee (CPC), the unemployment rate rose from 20 per cent to 60 per cent, especially among unemployed women.[49] Consequently, poverty increased from 50 per cent before resettlement to 87 per cent after relocation.

At FGDs, the hindrances to income activities identified included lack of work skills, isolation and landlessness. Most resettled people had poor education and 20 per cent were illiterate. Although the young ventured into cities in search of jobs, many failed to secure them due to lack of required skills. Resettled areas were largely isolated and only connected with other communes via small roads. The average daily travelling time to the workplace by motorbike for labourers was two hours after relocation instead of one hour earlier. While 51 per cent of household income before resettlement came from land use, including 15 per cent from agriculture, 26 per cent from planted forests and 20 per cent from husbandry, there was no income from land use after resettlement.

At many resettled areas in Vietnam, support projects are usually run to support the local people and enable and improve livelihood activities.[50] However, in the Tra Bui resettlement area, no such livelihood support programmes have been established following resettlement for the local people despite their isolated location. Although a programme in this vein was proposed by Bac Tra My Department of Agriculture and Rural Development (DARD) in 2013, it is still awaiting approval from the Quang Nam PPC. In the first and second year after resettlement, almost all households entirely used the cash received as compensation as well as the food support extended by investors for survival. Subsequently, these families are exposed to poverty and loss of food security.

Vulnerability and gender equality. Reduced natural resource access and unstable livelihood activities intensifies vulnerability and gender inequality. The Song Tranh 2 hydropower project has faced technical difficulties since operationalisation. According to the Bac Tra My DPC, the first was a crack that appeared along the barrage in 2012, which was followed by frequent and irregular earthquakes (the most intense earthquake in 2013 was 4.7 on the Richter scale, causing damage to 80 per cent of houses).[51] There were nine earthquakes in June 2014, contributing to confusion and fear among the local people. A majority of interviewees (85 per cent) wished to leave the resettlement area to get away from these earthquakes. Despite several exploratory studies into the reason behind these tremors, there is still no official word, clear conclusion or solution in sight.[52]

According to the Tra Bui CPC, in 2013, 20 per cent of children were malnourished and 85 per cent of households were ill-nourished for 2–3 months in a year.[53] The household survey showed that, following resettlement, only 5 per cent of women labourers participated in wage labour and 15 per cent in animal husbandry. Most women (84 per cent) stayed at home doing housework. In contrast, before

[49] CPC (Tra Bui Commune People Committee), Báo cáo kinh tế xã hội xã Trà Bui (2013).
[50] Nga, 'Dam development in Vietnam', op. cit.
[51] DPC (Bac Tra My District People Committee), Báo cáo về tình hình đời sống nhân dân tại các khu tái đinh cư công trình thuỷ điện Sông Tranh 2, huyện Bắc Trà My (2013).
[52] Doan Tranh, 'Livelihood for Resettled Communities' (Solo, Central Java, Indonesia, 2011).
[53] CPC (Tra Bui Commune People Committee), Báo cáo kinh tế xã hội xã Trà Bui (2013).

resettlement, 78 per cent of women labourers participated in cultivation and 60 per cent in natural forest exploitation. During FGDs, women voiced their worries, as they were then even more dependent on their men to bring in income.

Impacts on downstream communities

Besides the negative impacts on resettled communities, such as increasing poverty, limited natural resource access and rising gender inequality, hydropower projects also entail many unforeseen problems for communities in downstream areas. Downstream areas for the Song Tranh 2 hydropower project include the Dai Loc, Dien Ban and Duy Xuyen districts and Da Nang province. However, fieldwork conducted in the downstream commune of Dai An in Dai Loc district of Quang Nam province seems to suggest that the hydropower project has not achieved additional projected functions, such as regulation of stream flow, flood control and agricultural irrigation.

Instead of controlling floods, hydropower projects worsened flooding in downstream areas during the flooding season. According to Quang Nam PPC, during the 2013 floods, 92,000 households were affected, 11,600 ha of agricultural land was inundated, and damage was estimated at Dong 1,000 billion.[54] The Dai Loc district was the hardest hit, with damages totalling Dong 37 billion and 80 per cent of houses being flooded. Extensive interviews with key informants in the Dai An commune showed that they had lost nearly half their assets and livelihood activities had ceased for almost a month during the flooding season. The impact of floods was exacerbated by water discharged from the hydropower project, with late emergency warnings issued to locals not giving them sufficient time to prepare for the impending floods.

Hydropower development increased the likelihood of droughts. According to DARD, in 2013, 25,000 ha of agricultural land along Gia Vu-Thu Bon River faced water scarcity, thus making cultivation activities difficult for farmers.[55] In 2013, drought caused by dams built for hydropower reduced crop productivity by 10 per cent and raised the cost of crop cultivation by 15 per cent.[56] In 2014, the Quang Nam PPC estimated a crop productivity loss of 30 per cent if hydropower dams continued to retain water in the reservoir in the month of July.[57]

Increased salinisation resulted in the lower availability of water for agricultural and household use for downstream communities. The Da Nang DARD found that salinisation occurred for 35 days during May–June 2014 in an area downstream of the Gia Vu-Thu Bon River, which supplies water to 80 per cent of people in Da Nang province.[58]

Floods, droughts and salinisation lead to loss of assets and income, and also create vulnerabilities for the local people. Misconceptions were common. For instance, in the rainy season, many thought of the hydropower dam as a 'water boom' that would

[54] PPC (Quang Nam Provincial People Committee), Kế hoạch phát triển kinh tế xã hội tỉnh Quảng Nam (2014).
[55] DARD (Quang Nam Department of Agricultural and Rural Development), Báo cáo thiệt hại nông nghiệp do thiên tai gây ra (2013).
[56] DARD (Quang Nam Department of Agricultural and Rural Development), Báo cáo thiệt hại nông nghiệp do thiên tai gây ra, op.cit.
[57] PPC (Quang Nam Provincial People Committee), Kế hoạch phát triển kinh tế xã hội tỉnh Quảng Nam, op. cit.
[58] DARD (Quang Nam Department of Agricultural and Rural Development), Báo cáo tình trạng nhiễm mặn tại Đà Nẵng (2014).

break apart. Some people have even left their homes, going up to the mountains, to avoid such an eventuality.

Interviews with stakeholders revealed three different causes for the above situations, namely natural disasters, climate change and hydropower development. Many (47 per cent of interviewees) identified all three causes as a complex matrix that was leading to the increased flooding, droughts and salinisation being seen. Loss of forestland as a result of dam construction, changing water flow patterns and climate change were all suggested as grounds for these events. Many considered the water discharge and storage schedules of hydropower dams is illogical, as water was being discharged when downstream areas were already flooded and stored when downstream areas faced drought. According to interviewees, these schedules only served to make matters worse.

Opportunities for communities and profits from Song Tranh 2 hydropower project

Some solutions suit communities in both the resettled upstream area as well as those downstream. For people in resettled upstream areas, development cage fishing and livelihood improvement have been proposed. These projects may bring in new jobs, support money, financing and food, as well as increase awareness and knowledge through technical training courses. Ecotourism development of the dam's surroundings also holds promise for resettled people.

For downstream communities, stakeholders should meet and make public regulations concerning water discharge and storage schedules. At present, regulations are still conflicted by the technical difficulties and benefits associated with hydropower projects. Once these are solved, hydropower would be able to achieve additional functionalities, such as stream flow regulation, flood control and agricultural irrigation.

The Song Tranh 2 hydropower project has invested Dong 5,194 billion since 2006.[59] Since completion in 2012, it has been generating and supplying electricity to Vietnam with a capacity of 190 MW. Annual profits from the dam are around Dong 1,000 billion. And, due to the scale of financial gains involved, as many as 37 hydropower development projects have been developed on the Gia Vu-Thu Bon River.[60] These projects are expected to bring in huge profits for investors and support the economic development of Quang Nam province.

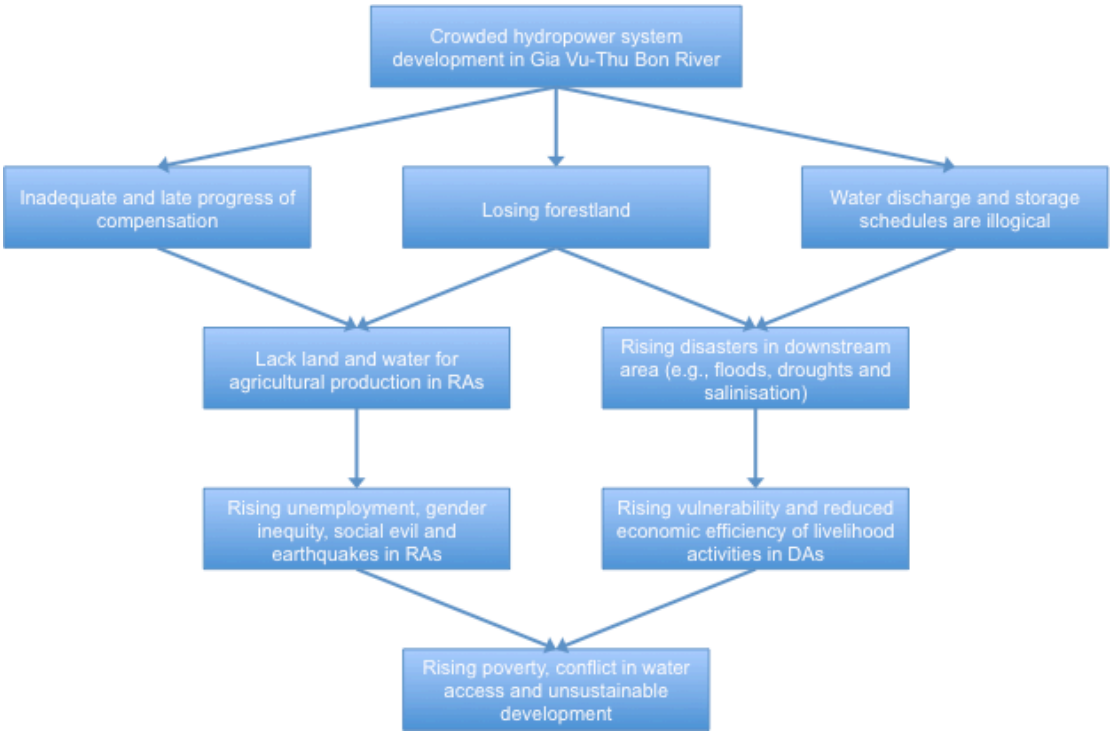
Problem tree

The problem tree (Figure 2) identified three causes associated with hydropower development in the Gia Vu-Thu Bon River basin. First, inadequate compensation of resettled people by investors in hydropower projects gave rise to reduced natural resource access. All interviewees in Tra Bui said that they were unsatisfied with the compensation policy, especially land compensation as they were yet to receive the land promised by investors. Local people were not involved as participants in the displacement and compensation processes. Compensation also did not stick to stipulated government policy. After resettlement, resettled people had no livelihood support programmes to turn to or livelihood activities (such as forest exploitation, forest planting and agricultural production) to satisfy their basic needs. Men resorted

[59] International Centre for Environmental Management (ICEM), 'Strategic environmental assessment of the Quang Nam province hydropower plan for the Vu Gia-Thu Bon River basin', op. cit.
[60] Ibid.

to illegal timber exploitation from the natural forests while women mostly remained unemployed.

Figure 2: Problem tree for rising poverty and conflict with respect to water access for both communities in resettled upstream areas and those downstream to the hydropower project.



DAs = downstream areas; RAs = resettled upstream areas
Source: Data gathered during stakeholder meetings at the upstream and downstream sites, 2014.

Illogical water discharge and storage schedules from hydropower dams were a leading cause of negative impacts on downstream communities. Water was discharged at the same time from all hydropower projects in the Gia Vu-Thu Bon River basin and the water discharge warning, which was issued only 12 hours before the discharge, came too late for downstream communities to be able to withstand the subsequent flooding or protect their assets. Conversely, water shortage in downstream areas during the dry season was made worse as the reservoir also stored water instead of releasing it during such times. At the meeting of stakeholders, investors in hydropower projects claimed that flooding and drought were caused by climate change and not the hydropower project. However, this argument was opposed by others. Stakeholders concluded that the loss of huge areas of forest cover due to dam construction and the great number of hydropower projects on the river systems were basic reasons for many of the problems facing downstream communities.

Gaps in water resource management

The impacts on livelihoods and natural resource access for affected people reveal inadequacies in compensation regimes associated with hydropower construction. Compensation was only focused on the loss of land and physical assets while other losses, such as the loss of access to water, for both the resettled upstream communities and in downstream areas tended to remain ignored.

People did not fully appreciate the vital role that water played in their livelihoods until they had relocated to areas with limited water supplies. Due to this lack of understanding, they did not require the hydropower company to compensate them for their loss of water access. Despite appreciating the link between water access and land-based livelihood activities after resettlement, people were unsure of how to address the issue. While recommendations, such as the need to build irrigation systems were communicated to local authorities and the electricity company, these were yet to be acted upon.

There is no way of calculating the appropriateness of compensations for loss of water access within the compensation policy. Water used for agricultural activities does not provide direct benefits, but is a necessary input for making productive use of land. As the Water Law regulates that users do not need water use certificates prior to using water resources, there is no legal basis to require investors to compensate people affected when loss of water access is faced by resettled people.

At the same time, the Water Law states that water users, such as hydropower projects, have to compensate local people for losses due to their using water. In this study, hydropower projects were found to have caused much loss and damage to the assets of people in downstream areas. However, hydropower investors had not compensated downstream communities due to contested views on the actual cause of these damages – natural disaster or the project itself. The Water Law is not concerned with fixing responsibility for hydropower investors, nor is it involved in devising an effective compensation policy for these communities. As a result, it is the local people that continue to bear all losses and damages associated with hydropower development.

Conclusion

To sum up, hydropower has many negative impacts on both resettled upstream communities and on downstream areas. Because of inadequate and late compensation, the accessibility of natural resources and diversification of livelihood activities for resettled people remain poor and unstable. This was evidenced by findings, such as land area reducing from 1.5 ha/household before resettlement to 0.1 ha/household after relocation; income dipping from Dong 4.2 million to Dong 2.76 million; unemployment rising from 20 per cent to 60 per cent; the increasing proportion of poor (from 50 per cent to 87 per cent) in the local population; and, rising vulnerability, frequency of earthquakes and gender inequality. These have made life more difficult for resettled people.

Likewise, the impacts of hydropower development on downstream areas are increasingly complex and destructive, such as increasing flood and drought risks. For people involved in agricultural activity, this leads to increases in cost by 50 per cent and reduces profits by 15 per cent. Vulnerability is also heightened in terms of loss and damage to assets and housing during floods, shortage of water for agricultural and daily activities, and increasing salinity.

The hydropower system in Vietnam has seen rapid development since the 1990s.[61] However, the social, negative and unexpected impacts seen at the two sites in this study indicate that hydropower projects in the Gia Vu-Thu Bon River basin and associated appraisal processes have only focused on the technical and economic benefits of these projects. Although annual profits from the hydropower project are to

[61] Nga, 'Dam development in Vietnam', op. cit.

the tune of nearly Dong 1,000 billion, trade-offs between social and economic benefits have meant unattainable, lopsided development and a disadvantaged position for the affected communities.

Although the Water Law was improved, it is more concerned with water used for hydropower generation. Gaps continue to exist in relation to compensation policy associated with hydropower, and this has lead to inequality among water users. Water use rights of affected people are not identified in any official government document, and neither has the Water Law attempted to put a value on the water access rights of affected people. This has meant that water access rights of relocated upstream communities are often ignored when it comes to compensation. In a similar vein, fixing responsibility with hydropower investors for floods and droughts at downstream sites also finds no mention in either the Water Law or compensation policy.

Recommendations

While gaps in the Water Law and compensation policy continue to exist, causing inequality for affected people, the Vietnamese government and local authorities of Quang Nam province need to ensure that the Song Tranh 2 hydropower investor: (i) fosters and completes compensations as soon as possible; (ii) undertakes reforestation activities to replace 1,200 ha of inundated forestland associated with dam construction; and, (iii) puts in place effective warning and emergency systems that give at least a day's notice to downstream communities prior to the discharge of water. The government should also ensure that these requirements are applicable to all other hydropower projects in the country.

For resettled upstream areas, the compensation policy should require that the hydropower project's owner sets up a fund to support affected households. Allocating a small fraction of the profits earned from the hydropower project could create this fund, which could be used to support affected people in the long term, perhaps over 15–20 years. Support programmes and regimes should be put in place with the participation of all stakeholders, especially the resettled people.

The government, all stakeholders related to hydropower and Ministry of Environment and Natural Resource (MoNRE) should discuss and build clearly the mechanisms for compensation of water access rights as well as the compensation for damage and loss due to water use, and subsequently put these mechanisms into action. To accomplish this, the value of water in agricultural activities and the value of water accessibility will have to be studied and fixed. Based on the findings of these studies, the Water Law should be improved to ensure equity among all stakeholders.

The government, local authorities and all stakeholders should review and re-evaluate all hydropower projects in the Quang Nam province, in particular, and around the country, in general. Their social impacts need be carefully forecast and appraised. The appraisal process for hydropower projects will need to ensure the participation of affected people at all stages of project development as well as give due weightage to their voices. Development will be of no import if its social aspects are ignored or disregarded.