Sending the Right Bill to the Right People: Climate Change, Environmental Degradation, and Social Vulnerabilities in Central Vietnam

OLE BRUUN

Institute for Society and Globalization, Roskilde University, Roskilde, Denmark

(Manuscript received 29 August 2011, in final form 3 July 2012)

ABSTRACT

In a range of international reports Vietnam is pointed out as among the 5 to 10 most climate-vulnerable countries, which are taking center stage in global climate change assistance and thus attracting huge amounts of foreign aid for research, mitigation, adaptation, disaster management, etc. However, for various reasons relating to global and domestic politics, climate change adaptation and mitigation in Vietnam are separating from general environmental management, while at the same time failing to address social inequality. From a global justice perspective this may seem irrelevant but when the resulting technocratic approaches are applied to aid programs, addressing climate change as an autonomous field, the problems on the ground become distorted. Based on field studies in central Vietnam, the paper argues that fragmented approaches risk missing the target of helping the most vulnerable population groups, while ignoring the structural and environmental issues, which in many cases constitute more immediate threats to their livelihoods.

1. Introduction

Climate disruptions pose an enormous challenge to a range of developing countries with high population densities and sensitive ecosystems. Vietnam is identified by a variety of international sources as among the most vulnerable, particularly in terms of socioeconomic impacts (McElwee et al. 2010). It is described as ''one of the most disaster-prone countries of the world,'' in which ''the damage due to natural disasters has increased drastically'' (VARG 2006, p. 4), subjected to ''climate conditions that could result in significant numbers of climate refugees'' (Chaudhry and Ruysschaert 2007, p. 13), while a rising sea level will put more than 12 million people under stress and force many to relocate, affect agricultural production in coastal zones, and by the end of the century cost the country 6.7% of GDP per year (ADB 2009). The World Bank Economics of Climate Change initiative also identifies Vietnam as heavily exposed to the risks of weather variability and climate change, particularly storms, flooding, and drafts (WB 2010a). The typhoon Ketsana, which hit central Vietnam in 2009 and caused enormous damage, intensified both a focus on climate change and international attention to the country.

However, substantial inconsistencies were found between macro-level scenarios of climate change impacts and micro-level research findings from central Vietnam, and shall be explored in the following.[1] Special focus is on Quang Nam, a province of 10 408 km^2, a 100-km coastline, and a population of 1.5 million. The province has a high exposure, yet moderate sensitivity, to climate events (mainly typhoons, floods, and flash floods) and a relatively high level of poverty. Alongside exposure to extreme weather events possibly related to climate change, the province is undergoing rapid industrialization, including large-scale construction and changing land use practices with massive environmental impacts. Deficient regulation and enforcement add to the pressure on the natural environment. Thus the poor and vulnerable population groups, which take center stage in adaptation strategies and aid programs, are affected by a range of interacting global and domestic processes. In the following, I shall address three areas of potential climate

Corresponding author address: Ole Bruun, Institute for Society and Globalization, Roskilde University, Building 23.1, 4000 Roskilde, Denmark.
E-mail: obruun@ruc.dk

DOI: 10.1175/WCAS-D-11-00040.1

[1] This research derives from a Vietnam–Denmark collaborative research project on ''Impacts of Climate Change in MidCentral Vietnam'' (P1-08-Vie), funded by the Danida during 2009–12.

change impacts in central Vietnam (on land use, forests cover, and flooding patterns) and show how rural vulnerabilities are structured in each one.

2. Research methodology and approach

Research methodology included a comprehensive survey of 166 households across 16 communes in five districts, randomly selected across the local categories of poor, medium, and rich households. Apart from basic socioeconomic data, the survey recorded changes in agricultural and livelihood practices, impacts of weather and climate events, and ranking of livelihood stresses, community organizing, local institutions, public support, health issues, and other aspects of vulnerability. Households were interviewed and observed on their premises by teams consisting of a researcher and an assistant, and many were reinterviewed for clarification. An extensive range of interviews were performed with local governments and departments at commune, district, province, and city levels as well as with other local actors and stakeholders, including nongovernmental organizations (NGOs), businesses, workers, drivers, and various staff. As research issues developed, the surveyed households were used as access points to local communities, and were thus revisited time after time. Local statistics and other materials were simultaneously collected and compared with research data. A long presence in the area further allowed common participant observation and attention to ethnic minority issues.

The present approach to vulnerability research has a basic distinction between natural hazards, including those deriving from climate variability, and people's vulnerability to hazards (e.g., Wisner et al. 2004). This implies that social structures in the general sense may be the cause of vulnerability as much as they respond to external conditions (Hewitt 1983; Adger 1998). Social vulnerability, understood as an inadequate capacity of individuals or groups to cope with and recover from the impact of hazards, is primarily seen as a characteristic of society and its underlying social, economic, and political conditions (e.g., Gaillard et al. 2007). This is well captured in the disaster ''pressure and release'' (PAR) model, tracing the progression of vulnerability through root causes in society itself, dynamic pressures in institutions and macroconditions, and unsafe conditions of all sorts in local communities; disasters then occur between progressing vulnerability on one side and natural hazards on the other, like a ''nut in a nutcracker'' (Wisner et al. 2004, p. 50). This is not a denial of the significance of ''place'' in the sense of proximity to the source of a natural threat (Cutter et al. 2009, p. 4). Yet place is not a consistent factor: the most vulnerable people may not live in the most vulnerable places,[2] while conversely, even fragile physical environments may provide access to wealth for some people (Moser 1998, p. 3; Chaudhuri et al. 2002; O'Brien and Leichenko 2000, p. 224). As shown below, many risk-prone areas in central Vietnam at the same time offer great economic opportunities. As a further argument, any complex society may be expected to have regulatory means to offer some measure of compensation for place-specific exposure.

In a Vietnamese context the household still tends to be the basic socioeconomic unit for which vulnerability strikes through in key variables, like access to land, livelihoods, and employment; household composition; education; social group belonging; ethnicity; and access to financial and other transfers from outside. Some recent arguments concerning context dependency seem relevant for Vietnam: that social and political inclusion or exclusion is crucial for vulnerability, as particularly marginalized groups may lack voice and influence on decision making (Eriksen et al. 2011).

3. State policy, donor commitments, and vulnerability

A National Target Program in Response to Climate Change, drafted by the key Ministry of Natural Resources and Environment (MONRE) and approved in 2008, urged ''all ministries, sectors and localities'' to respond to climate change. Several ministries such as the Ministry of Agriculture and Rural Development (MARD), the Ministry of Science and Technology (MOST), the Ministry of Industry and Trade (MOIT), and the Ministry of Transport (MOT) announced their own action plans, to be coordinated by MONRE through a new strategy (LAV 2011). These strategies all draw on the U.N. principle of ''common but differentiated responsibility,'' in reality presupposing massive transfer of foreign funding and technology.[3]

Vietnam is already among the top aid recipients in the world and total foreign aid rose steadily until 2010, when 4.6 billion U.S. dollars (USD) was disbursed (over 4% of GDP). With average growth rates of 7% since 2000, Vietnam has been an international donor priority, allowing donors to show their dollars' worth. The country is generally praised for poverty reduction and for drafting plans to resolve issues relating to climate change and

[2] In comparison, the Intergovernmental Panel on Climate Change (IPCC) in general terms defines vulnerability as a function of exposure, sensitivity, and adaptability.

[3] The target program had a total budget of $100 million (U.S. dollars), distributed between 50% foreign funds, 30% central budget, 10% local budget, and 10% private funding (SRV 2008).

a sustainable environment.[4] In addition to multilateral funding from The World Bank (WB), the Asian Development Bank (ADB), international NGOs, the United Nations, the European Union, and others, a range of bilateral donors—with Japan, South Korea, France, Germany, and the United States as the largest—have committed to massive aid.

An increasing share of foreign aid is allocated to climate change and disaster prevention (e.g., one-third of Japanese aid). However, foreign aid is facing decline since Vietnam rapidly approaches a middle-income country status; several donors intend to phase out from 2012 (VBN 2011). Moreover, a continued high level of corruption and a lack of transparency are widely reported (e.g., Pham 2011; Brown 2012) and have caused grave concern to be voiced at donor consultancy group meetings (e.g., VFN 2010). Inevitably, corruption also creeps into climate change projects.[5]

The Vietnamese government's position is forthright. Leading up to the fifteenth Conference of the Parties (COP15), Vietnam and a number of other climate-vulnerable countries signed a declaration stating, ''Anthropogenic climate change poses an existential threat to our nations, our cultures and to our ways of life, and thereby undermines the internationally protected human rights of our people... ,'' at the same time stating that ''Developed countries bear the overwhelming historic responsibility...'' (Draft Declaration: Climate Vulnerable Forum, November 2009; see news.mongabay.com/2009/1110-hance_declaration.html). Accordingly, at the Association of Southeast Asian Nations (ASEAN) summit in 2010 leading up to COP16, Vietnam together with the other member states urged developed countries to ''provide scaled-up, new and additional, adequate and predictable funding to the developing countries,'' taking into full account their special needs and specific situations (ASEAN Statement, Article 6, 16th Summit; http:/www.aseansec.org/24515.htm).[6]

The broadening awareness of adaptation as a necessary response to climate change is reflected in international policy initiatives (e.g., WB 2010a), which aim at reducing the vulnerability of both natural and social systems. Because developing countries are expected to bear the brunt of impacts from climate disruptions and have less adaptive capacity, it is considered expedient to support both their national programs and local communities, particularly in rural areas. In a Vietnamese context, climate change is predicted to endanger especially rural poverty reduction (e.g., Sperling 2002; Oxfam 2008; McElwee et al. 2010, p. 16). But national priorities may differ from donor policy.

When the international climate debate, fashioned by a multitude of research communities, business interests, governments, and civil societies, is adopted into a one-party state it inevitably loses many facets, and policy making may stand on a narrower base. Vietnamese universities and research centers are susceptible to influence from stakeholder ministries such as MOST and MONRE and expected to support the overall government position expressed in key documents and strategies (e.g., MONRE 2007, 2009; ISPONRE 2009). A culture of strictly vertical structures (VARG 2006, p. 33; Son et al. 2009; Fortier 2010) means that the same party–state hierarchies potentially control the entire food chain of reporting data, modeling climate change, formulating policies, and allocating resources. A strong natural science orientation, as opposed to a secondary and often administrative role granted to the soft sciences combined with restricted access to policy criticism,[7] further promotes a focus on mitigation of external threats at the expense of studying the internal, essentially social production of vulnerabilities. Vietnamese scientists are thus subjected to institutional struggles over the purpose of doing science and the authority to practice it, while navigating between internal hierarchies, demands for international cooperation, and personal ambitions (Zink 2011).

4. Changing land use patterns

It has been suggested that rising sea levels by 2040 potentially will impact 10% of the rice cropping areas in lowland central Vietnam, endangering food security and livelihoods, at the same time making the country dependent on imported foodstuffs (ADB 2009). Similarly, a 10%–20% rice crop reduction from climate change is forecasted on the national level and 13% in the Mekong

[4] For instance, the WB country director recently called it a model to follow and that the country should share its experiences with the rest of the world (VFN 2010).

[5] In June 2012, Danida announced the suspension of three out of four ongoing climate change research cooperation projects with Vietnam (including the present) after an unscheduled revision had indicated a serious ''unjustified use of funds'' (Danida, Doc. C 1176, 25 May 2012).

[6] Developing countries at the same time sparred over vulnerability and access to the new multibillion-dollar Green Climate Fund, as a new instrument vulnerability ranking is now attempted by several institutions; one such is the private company Maplecroft, which ranks Vietnam no. 13 among the extreme risk countries based on multiple social, economic, and environmental indicators.

[7] In 2009, a new law (Decision 97) forbade ''opposing the line, objectives and policies of the party and state'' in public and effectively closed down the only independent policy think tank, the Institute of Development Studies (IDS), while restricting the right to conduct policy research on the Communist Party.

delta, Vietnam's ''rice bowl'' (WB 2010a). Further, it has been suggested that rural population groups, 73% of which are dependent on agriculture (Nguyen 2011) and whose livelihoods are undergoing declining diversity (McElwee et al. 2010), will suffer the most from climate change impacts, including increasing frequency of typhoons, heavy rains and flash floods, and intrusion of seawater (ADB 2009).

The coastal areas in central Vietnam, however, are already undergoing rapid transformation because of urbanization, construction, tourism, and, not least, shrimp farming. The province of Quang Nam, like most other provinces in Vietnam, explicitly aims at an industrialized future, with a stated policy gradually to reduce the economic share of agriculture (40% in 2000 and 25% in 2008; Quang Nam Statistics Office 2009) to 15% already in 2015. During 1998–2008 the province already lost 17% of its rice cropping areas but still managed to increase production by 15% (Quang 2010) and increase exports because of intensified production methods with support from many donors, including improved varieties and hybrids and consistent use of synthetic fertilizer and pesticides. This resonates with Vietnam's total rice export, which despite the predictions above set dual records in 2010 with a volume of 6.88 million tons and a value of 3.23 billion dollars. Vietnam is now challenging Thailand as the main global exporter of rice, hardly an indicator of imminent food security stress.

With the present rate of development in Quang Nam, concentrated along the great traffic ores on the coast, it is doubtful how much rice farming remains in coastal areas by 2040. Large infrastructure and disaster mitigation works such as dikes, reservoirs, and wetland development are concentrated along the coast to secure further urban, industrial, university, airport, and mass-tourism developments.[8] The three key areas for mitigation works in Quang Nam are the cities of Hoian and Tam Ky and the industrial zone of Chu Lai. National priorities are set in budget allocations: the National Program for Disaster Prevention, with a clear focus on coastal areas, has a funding of nearly 10 billion dollars up until 2015, which is 100 times more than the funding for the National Target Program to Respond to Climate Change (approximately 0.1 billion dollars). The precise budgets for Quang Nam are not published, but the relation between them is believed to be the same. Obviously these priorities further expand capital accumulation opportunities in coastal areas, rather than laying the ground for a long-term adaptation strategy based on a democratic resource allocation (Fortier 2010).

Unequal development between coastal and inland areas, such as previously experienced in China, is rapidly becoming a reality in Vietnam under the market economy (e.g., Ha 2007; Chaudhry and Ruysschaert 2007). This is not only reflected in higher economic diversification in coastal areas, but also in a great discrepancy in poverty levels in Quang Nam, ranging from 5% to 10% in coastal districts to 40% in mixed-ethnicity highland districts (district statistics 2009), with examples of ethnic minority districts ranging over 50% (ADB 2010, p. 6).

Under the market economy conventional family farms have lost much of their attraction because of the hard labor input and low income that may be earned from the small plots, most often just in the range of 500–2000 m^2 per household. Today, those households only depending on such traditional family plots will belong to the poorest segments of the local population. Any household with spare labor will seek to gain income from additional sources, such as day labor, migrant work, small business, fishing, or collection of items for sale (such as medical plants, water snails, or small crabs). According to our survey, 75% of rural households across the province now depend on two or more activities for their livelihood/income, with a tendency toward only the poorest (such as elderly without younger generations in the household) and the wealthiest (having accumulated land) depending exclusively on agriculture. Reliance on agriculture is not an option for common households in coastal areas; as such, it would not even provide the basic necessities. Rising costs of living and new costs associated with the market economy, including substantial fees (many of which are illicit) for secondary schooling, for higher education, for medical treatment, and for various fees to local government demand virtually all households with young children to engage in money-earning activities outside farming. At the same time, this is the opportunity to lift the household out of poverty and participate in the generally rising living standards and acquire the cherished new consumer goods such as TVs, refrigerators, motorbikes, and mobile phones as well as to build new and better housing.

Typical rural strategies involve one or several household members taking care of the family farm, while others engage in wage labor, either locally where available, in regional industrial centers, such as Danang and Chu Lai Open Economic Zone, or distant centers like Saigon. For instance, parents may stay back while adult children do migrant work; the wife may take care of farm, house, and kids, while the husband works in construction somewhere on the coast; the husband may do the farming and the wife runs a little local business such a kiosk, grocery shop,

[8] A list of present climate-related projects with aid funding in Quang Nam province (provided by the Danida office in Tam Ky) shows overwhelming focus on coastal areas and water ways, while a distinction between mitigation and adaptation projects is not easily made.

restaurant, hairdresser, or cafe. Other common strategies include engaging in shrimp farming as described below, starting small sidelines, selling the land to engage in business, or packing up and migrating to other areas. There are endless variations, but over the same theme—namely, that farming alone will equal poverty. Overall, our survey indicated that the share of household income from agriculture varied between districts, from 32% in the coastal districts (pointed out as the most vulnerable, but actually have much higher economic diversification) to 74% in a highland minority district. There are many opportunities in coastal areas, and despite relatively low salaries [ranging from 30.000 Vietnamese dong (VND)/$1.4 to 120.000 VND/$5.7 day^{-1}] households with ample labor will have good access to a better life.

In accordance with the theoretical framework, vulnerabilities were spatially dispersed and mostly related to structural factors. They were concentrated in those households that had insufficient labor to participate in the new market economy (e.g., owing to social or health-related problems) or suffered from economic, social, or cultural marginalization. Unfortunately, there is a great deal of these households, and they are mostly on their own. Both survey and fieldwork indicated that a large proportion of common households (20%–30%, depending on criteria) indeed had one or several problems detracting from their ability to participate in the market economy and thus were in a highly vulnerable position. Health problems and disabilities among household members constitute maybe the single most important category, in many cases entirely wrecking the household economy. Another poor and highly vulnerable group consists of elderly people without descendants in the household, without the capacity for wage labor and hence depending on small farms; particularly widowed elderly were among the desperately poor. In general, the poorer population segments ranked several stressors fairly equally, including poor health, land–water–capital–employment insufficiency, and weather/climate events (O. Bruun 2012, unpublished manuscript).

In the Vietnamese "market socialism," by some dubbed "shamelessly capitalist" (Painter 2005; Fortier 2010), there is generally very little public support,[9] and poverty alleviation mechanisms concentrate on loans for new house building.[10] Household self-reliance is the norm and children are supposed to provide for their parents. However, children migrating to distant places are not always in a position to help out, reportedly, as they spend a large share of their income to support themselves because of low salaries and increasing urban living costs.

Poverty rates are notoriously confusing; those issued by the Government Statistical Office (GSO) take their outset in food poverty plus minimum nonfood requirements for a general poverty line (Phung na), most recently raised to 400.000 VND/$19 per month in rural areas. The government usually prides itself with an exceptional poverty reduction since the inception of the Doi Moi policy: from an overall rate of 57% in 1985 to merely 7% in 2005 (food poverty), while more recent number series use the general poverty line, claiming a reduction from 22% in 2005 to 9.45% in 2010 (DTInews 2011). Yet literature on climate vulnerability may use higher figures, such as from a 2001 GSO household living standards survey indicating an overall poverty rate of 29% (e.g., VARG 2006) or 2006 figures of 15% (e.g., WB 2010a). The survey indicated a very high rate of self-evaluated/perceived poverty (51%) as compared to the overall provincial rate of 15%. More significantly, however, while the well-off had high expectations of increasing their income, the middle group had lower expectations, and the poorest segment had zero expectations (O. Bruun 2012, unpublished manuscript), which is consistent with a rising gap between coast and inland as well between majority population and ethnic minorities (Swinkels and Turk 2006; WB 2010a).

Agricultural development in coastal areas is marked by an increasing share of production value that derives from aquaculture—mainly shrimp and crab farming. Particularly in flat coastal areas where freshwater is available, this has developed on a massive scale, making up no less than 21.5% of agricultural production value in 2010 in Quang Nam and having increased 8.7 times in just 10 years. This is a huge addition to the productivity of rice farms as they occupy the same coastal lands in many places. National plans are to further triple production by 2020 (WB 2010a) to generate income increases and boost exports (shrimp farming now brings in more than 2 billion USD per year, making Vietnam a main exporter).

Vietnam's shrimp aquaculture has led to large-scale destruction of coastal environments and wetland habitats (Shanahan et al. 2004). Coastal mangrove forests, seen as an important natural means of mitigating disasters, have been indiscriminately felled to make room for agriculture, aquaculture, and construction; state sources admit that up until 1995 the southern Quang Ninh and Hai Phong provinces lost three-quarters of their mangrove forest, amounting to 40 000 ha (WEPA 2011); no figures are available for Quang Nam, yet for the Thu-Bon River delta, where the Nipa mangrove palm grows, losses are

[9] Small public funding may be provided for the official categories of vulnerable people, including invalids, elderly without relatives, orphans, and laborers with limited schooling (McElwee et al. 2010), but assessment of their needs rests on local government.

[10] The main poverty alleviation activity of local governments is loans or grants for house building in especially the poorer districts, often with government, foreign donor, or NGO support.

also reported to over three-quarters, equal to nearly 60 ha (http://www.scribd.com/doc/59092028/TQuangnam-Presentation).

Shrimp farming is an inherently risky form of production, both environmentally (Shanahan et al. 2004) and economically (MF/WB 2005) when placed in the typhoon belt of central Vietnam, but farmers are willing to take the risk because of the far higher profits that may be had from a successful batch of shrimps as compared to rice farming (shrimps are processed at local factories for export). When typhoons strike, such as the Ketsana in 2009, economic losses are obviously very large because entire shrimp ponds are flooded and the shrimps lost, but it is a calculated risk in a historical disaster-prone environment. Shrimps are grown in previous swamps or in agricultural land, mainly well-irrigated paddy fields, which are dug up in ponds, typically around 1000 m^2, with earth-built banks and a water depth of 1.2–1.5 m. Simple diesel-driven machines with blades attached to long shafts circulate and oxidize the water at regular time intervals. Shrimp farms were initially established by small farmers in an unregulated fashion, some working in small groups to pool their land, but were quickly taken up by new entrepreneurs; many of these were able to build great new houses, buy motorcars, and send their children abroad to study. This is symptomatic of a rapid social differentiation, as private investors and consortiums can freely buy up land while hiring former small farmers as cheap labor.

The immediate risks to shrimp farming do not derive from climate change as such, but from the nature of this industrialized monoculture, including disease (which regularly wipes out shrimps in large areas; e.g., VBN 2010), natural conditions, and environmental degradation (shrimp farms may release nutrients, antibiotics, and chemicals). Rising sea levels, even if assessed at a maximum of 10 cm $decade^{-1}$ (presently 3 mm yr^{-1} in Vietnam like the global average), will only constitute long-term challenges. Most acute is the challenge from water pollution in the lower reaches and deltas of rivers. One of several sources is the expanding coastal tourist industry, as hotels and restaurants generally emit unfiltered water into rivers; according to local observers and visible to passersby there is no enforcement in place. In the area around Hoian, a famous tourist destination, large areas of shrimp farms are already abandoned as the water quality is inadequate, which has resulted in many farmers losing this source of income.[11]

Other pollutants also threaten this lucrative business. As farmers intensify rice production, chemical fertilizers and pesticides are emitted in high amounts. Unavoidably, waterways will have elevated phosphorous and nitrogen levels (precise data are not available). Other pollutants, such as oil spills and emissions from new industries in Quang Nam, will further contribute to the degradation of waterways. Overall, and despite government efforts and support from WB and other donors, the state of the environment in Vietnam has continued to degrade, especially concerning water resources (WB 2010b); this is unrelated to climate change.

Another particularly hazardous source of pollution in Quang Nam, impacting rice and shrimp farming, is the rapidly expanding gold mining by both larger companies and a range of smaller entrepreneurs, down to individual gold diggers working at random in the landscape. Again, factual information is hard to come by. In a media-reported case in Phu Ninh, a district close to the coast, a company (registered for using 9.5 tons of cyanide per month) was accused by local communities of emitting thick fumes into the air at night and unfiltered water into rivers, causing the death of all marine life. A company spokesman maintained that the company obeyed all environmental regulations, with the manager adding, ''The death of large numbers of fish has occurred at many places. It is supposed to have been caused by heavy rain and unpredictable weather changes.'' For official testing at the state Quality Assurance and Testing Center the company was permitted to submit its own water samples (LAV 2008).

5. Changing forest cover and forestry

During typhoons, such as those hitting the province in 2006, 2007, and 2009 (often interpreted as indicative of climate change), destruction of large forest areas causes heavy economic losses. The losses are almost exclusively in plantation forestry, however—mainly on small private acacia plots—but also to some extent on larger, business-owned eucalyptus, rubber, and coffee plantations. Two interlocking trends in forest cover in Quang Nam must be considered to get a clearer picture of vulnerabilities: one is the rapid spread of particularly acacia plantation forestry for pulp export to the paper industry and another is deforestation.

In highland areas, fast-growing species of acacia (acacia mangius, acacia auriculiformis, and a local hybrid) are rapidly spreading on previous ''unclaimed land,'' a category in the Vietnamese land law of 1993 signifying land that has not been cultivated for 5 years or more, but presumably in most instances being mixed growth forest (owing to previous state forestry) and previous natural forest (owing to ongoing deforestation). Forestry under the State Forestry Enterprise system, which expanded

[11] The total decrease of water surface for aquaculture was 600 ha from 2009 to 2010 (Quang Nam Statistics Office 2010).

from north to south after the war, is generally believed to have taken a heavy toll. The 6.3 million ha under management shrank by 3 million ha during 1975–90 (Nguyen et al. 2009, p. 6), leaving large areas of mixed and degraded growth (Thuong et al. 2005).

Acacia forestry begun as state-supported reforestation programs, but has accelerated on market terms in recent years to become the preferred production form on marginal lands, both among common households and investors, very often connected with land claiming. Private households typically have several hundred square meters and up to 10 ha—in Que Son district as much as 15–20 ha—and many places increasing. Yearly growth is stated as up to 15 tons ha^{-1} yr^{-1} on the better soil, representing a cash value of 12 million VND ($600) ha^{-1} yr^{-1}, and somewhat lower on marginal soils such as in higher mountain areas. Since many of the smaller forest owners are short of cash, however, and because acacia is a high-risk crop in areas exposed to typhoons, much acacia is cut after just 4–5 years and the cycle repeated. During the first year of growth, the small trees will be mixed with a crop of cassava or beans, and later domestic animals may graze between trees. Thus, acacia has entered a regular agricultural cropping cycle to become a highland cash crop (only in the last period of growth meeting a minimum forest definition).

More problematic, however, is the fact that despite acacia is usually praised for its potential to produce good timber quickly (as well as being nitrogen fixing) and thus to relieve the pressure on the natural forest ecosystems, in central Vietnam it has the opposite effect: natural and mixed forest are cleared to make room for further acacia production as it has proven a positive model for local farmers. During the Ketsana in 2009 up to 30% was lost: trees were just abandoned or burned on the ground. Though acknowledged as ''risky business'' by farmers in especially highland areas, where there is no longer protection from old forest, acacia production is encouraged by local governments and eagerly embraced by local communities across Quang Nam because the profits still make it worthwhile. Very similar to shrimp farming, it provides people with a greater sum of cash money than they have ever put their hands on before, enabling many to build new houses or buy attractive consumer goods.

Deforestation of natural and mixed forest is linked with the socioeconomic conditions in local communities, but it is as much related to the balancing of interest between various forest user groups and the efficiency of state regulation to that end. Poor regulation and protection, according to local observers intimately linked to corruption, allow selfish interests to dominate when the forest is cleared without any replanting; privatization for acacia follows in its wake and former user groups lose access.

Illegal logging is everywhere practiced, and confirmed by district forestry departments, which openly admit that they have no means of protecting the deeper parts of forests.[12] Some illegal hardwood may be confiscated, but according to well-informed locals and drivers, most illegal timber passes through by means of routine bribing. Illegal logging is sadly encroaching upon forest reserves everywhere in Quang Nam with little restraint. Reportedly, illegal logging is well organized and smoothly operating particularly in the Dai Loc, Nam Giang, and Tay Giang districts, where groups of men with professional equipment, including trucks, guns, and Western brand chain saws, will extract and prepare the timber and transport it to the coast for manufacturing or shipment.

As is the case with illegal wildlife trade (Thuong et al. 2005), illegal logging will inevitably involve people of authority, from local communities upward. Many examples were encountered in our field studies, showing that a range of groups participate. During a walk to the natural forest with a local guide—the vice chairman of a commune in Nui Than and member of the commune forest protection task force—we came across a large hardwood tree (lim) that had just been cut, and a professional chainsaw was lying on a prong, as the owner had gone into hiding. We suggested that he remove the saw, but he refused, and as it later turned out because he was well aware of the illegal logger—his brother in law. Another incident is worth recounting. At a visit to a minority area in Nam Tra My we spoke to a couple of police officers and a commune leader who approached us, all young men in their 20s. As praise to the natural beauty of the area I remarked that it could be developed for tourism. They laughed heartily, one saying, ''Ah, that is not at all necessary; if we need money we just cut a tree and sell it,'' another adding, ''Yes, that's what everybody does; there is nothing else for young people to do here!'' On accessible slopes in the forest around us cutting went on uninhibited. Yet another example of large-scale deforestation could be drawn from a protected forest area, where a minority village had been resettled after hydropower construction had occupied their land: several hundred ha of protected pine forest had been cleared to make room for traditional highland rice and cassava cropping. Commune authorities had attempted to prevent the logging by arresting a few, but according to locals, ''They could not arrest us all.'' The newcomers had apparently been assisted by the resident communities and all had taken part in the feast when regulations broke down.

[12] Interviews with forestry authorities in Dai Loc, Bac Tra My, and Que Son districts DONRE land use map and statistics, 2005–2010.

Interviews with a long range of carpentry and woodworking shops in the five surveyed districts of Quang Nam turn out a consistent picture. All wood for construction (roof beams, door and window frames, doors and shutters, and in some areas also for entire wooden houses), furniture (beds, tables, chairs, etc.), and other purposes are exclusively extracted from the natural forest. Just a few cases of mainly poorer people using acacia for roof beams were recorded. There is no organized plantation forestry for timber production, and no registered replanting of the natural forest.

Illegal logging stretches upward from young local people short of cash to organized criminal gangs, and further upward to large-scale illegal logging for Vietnam's lucrative hardwood furniture industry, drawing timber from Vietnam and across the border into Laos (EIA 2008) and exporting across Asia. A network of Forest Protection Department control posts on main roads from highlands down toward the coast, intended to curb illegal logging and wildlife trade, prove ineffective for changing the situation. As confirmed by local people all over the province, anywhere accessible by trucks, motorcycles, or oxen, valuable trees are cut and the forest gradually depleted.

The above are mainly qualitative data, which might be anecdotal and potentially contradicted by statistical data. The core of the matter is, however, that hard data are not readily available and tend to be rife with contradiction and confusion, as there are no consistent data time series (Nguyen et al. 2009, p. 1). A total of 57.6% of Vietnam's land area has been classified as forest by government decision, while other government agencies (MARD) state an increase from 27% in 1992 to 36% in 2006 (Nguyen et al. 2009, p. 5). A local-level outcome of these decisions is a commune planning category of ''forest without trees,'' to which could be added another category of ''protected forest without trees.''[13] Data on acacia and other plantation forestry is used to prove Vietnam's reforestation success and the new climate change plan (MONRE) suggests government and foreign support to higher forest cover (VE 2011). As opposed to official statistics claiming constant natural forest coverage in Quang Nam, NGO sources and independent research assess it to be rapidly dwindling (Bruun and Casse 2013).[14]

What are the implications of forest resource depletion for local vulnerabilities? A chain reaction of environmental impacts, including greater risks of landslides and flash floods, is possible, but remains unexplored. Increasing landslides are reported by local farmers, who express concern for deforestation as a root cause, but the link to deforestation is disputed by Vietnamese state researchers, who concentrate on heavy rains as the trigger (e.g., Huan et al. 2010). More obvious consequences, however, relate to the gradual privatization of public resources in the overall process of deforestation and land reclamation. Despite the ban on logging, it is nevertheless in many locations taking place with open and equal access, providing cash income for particularly marginal groups such as ethnic minorities. Plantation forestry, on the other hand, may provide some day labor opportunities, but no access to timber, grazing, or nontimber forest products (NTFPs). A narrower regime of livelihood components may result in mountain areas. As a separate concern, several district governments report that with the present quest for land there is no longer space for land reallocation to poor households or as compensation to those suffering landslides,[15] thus adding new dynamic pressures.

The structural vulnerabilities described for coastal areas also apply to the middle-to-higher lands. These areas have higher poverty levels, partly because regular wage labor is less available. Many supplement farming with day labor, such as farm work, acacia harvest work, private house building, transportation, road work for government, or doing odd jobs for the better-off. Migrant work is very common, especially among the young; in some districts as much as 50% of those over the age of 20 will have migrated either temporarily or permanently. Similar to coastal areas, there is a high coincidence rate between poverty and other social- or health-related problems.

[13] In problem areas such as the retreat of the natural forest, Vietnamese government authorities tend to publish planning figures rather than actual data. The statistical bureau reports a constant area since 2000 despite extensive hydropower and other construction (Quang Nam Statistics Office 2010), but without breakdown into districts. The provincial Department of Natural Resources and Environment (DONRE) issued 2005–10 land use planning figures showing successful growth of all categories of land use, including forests (total area growing 25% to a total of 6720 km^2/66% of the total land area). Yet the separate category of ''forests'' is not immediately intelligible because the categories of agricultural land, nonagricultural land, and unused land already make up 100% of the land area. Forests is thus a category that cuts across basic land use categories without specification (e.g. interview, head of forestry department, Le Van Truong, Bac Tra My district, 2 February 2010).

[14] A general problem with local statistics is the cumulative reporting from village to commune to district and so forth, each level besides reporting having separate program and policy implementation duties.

[15] District level authorities claim that they have neither funding nor authority to implement mitigation or adaptation projects themselves, despite that many problems call for local solutions, such as small dikes, river embankments, or strategic reforestation on steep slopes.

When the young people leave, elderly farmers may eventually give up their land. Like shrimp farming, acacia forestry has become an investment opportunity for both better-off locals and people from coastal areas—typically business owners—securing them access to land and with time also a profit on their investment. Thus, a long-term trend of land concentration is set in motion, though common in the development process and not in itself causing rising inequality.

Vietnamese authorities concentrate their poverty alleviation efforts to the poorer ''mountain districts.'' Primary schooling is free here (but parents still pay for secondary schooling) and government funding provides a yearly quota of low-interest loans for house building, and in some cases for small business investments. Cash transfers to poor households are not common, however, and tend to be a last resort. To be classified as ''very poor'' and obtain the document that qualifies for public support is not easy; in practice, only a few elderly people are given small monthly allowances, and a larger group may be given a yearly package (typically 10 kg of rice and 200.000 VND) before the Tet holidays.

6. Changing river flows and flooding patterns

As a last issue, the prospects of intensified rains causing more severe flooding and flash flooding, such as suggested in the literature (e.g., ADB 2009; WB 2010a), deserve attention. During the last several years Quang Nam has seen hydropower construction in nearly every possible location, mainly performed by the national electricity company VietNam Electricity (EVN). When the provincial hydropower plan was approved by the MOIT and the Quang Nam People's Committee in 2006, it included close to 40 projects, of which 8 were large scale. Already in 2008, when projects mounted to over 60, an ADB strategic environmental assessment concluded that the plan was detrimental to the economy of the province and would have serious negative consequences for the natural systems as well as for the livelihoods and well-being of the ethnic minority groups affected (ADB 2008, p. 7); it further raised a series of critical strategic concerns for mitigation, including water supply (ADB 2008, p. 142). Today, data on the full scale of these operations are not publicly available (and not all operations are registered), but may count from 60 and up to 110 stations on the upstream Vu Gia–Thu Bon River, of which 10 are large scale (Cafe 2009).

Hydropower stations are planned without involving the affected communities, and there is no legal obligation to even inform them. Environmental impact assessments may be carried out as demanded by Vietnamese law and the international donors involved in financing (e.g., ADB and WB). A 2009 press release from MONRE stated that by surprise inspections at nine hydropower plants in Quang Nam, all were found to breach their promises on environmental protection (LAV 2009a). The plants were found to destroy the forests, blocking the natural flow of rivers and polluting the water, without taking into account the ecological consequences upstream and downstream. The unusually harsh criticism included allegations that builders of power plants and local governments generally ignored scientists, as well as deliberately underreporting the damage from projects (LAV 2009b).

Although hydropower may be an efficient means of climate change mitigation, it is everywhere seen to create new challenges to local communities. For instance, in the Dai Loc district the controversial A Vuong hydropower station on upstream Thu Bon River reportedly caused the water level to rise an extra meter or more during the seasonal flooding, causing traditional flooding measures in river bank communities to be insufficient. In addition, both local farmers and NGOs working in the area reported vastly increased sedimentation in parts of the district, in many cases burying fields in sand and mud.

Conflicts over hydropower construction escalated during the 2009 Ketsana typhoon. The same A Vuong hydropower station allegedly without warning released 150 million cubic meters of water during the height of the rains, resulting in a catastrophic downpour of water masses (LAV 2009c). According to the city government in coastal Hoian,[16] which experienced the highest flooding for decades, the maximum flood level, which is usually reached after two weeks of rain, was reached after just three days, causing immense losses to the unprepared citizens. Farmers and local authorities along the river in lowland Dai Loc district equally complained of unprecedented water masses taking everyone by surprise, crushing houses and property and causing many casualties (163 people were killed during the floods) when people were caught in fields and forests. The event caused an unusual public debate, virtually a public outcry with open accusations against the hydropower manager, even turning the Ministry of Agriculture against the local People's Committee for allowing the release (LAV 2009b). It calmed down, however, when the hydropower plant itself carried out an investigation: calculations showed that its intake and outlet of water had remained the same during the rains, leading to the conclusion that the extraordinary rains, and implicitly climate change, was to blame for the flooding.

Hydropower has become the single most controversial theme in Quang Nam environmental debate, as

[16] Interview, People's Committee Chairman Le Van Giang and staff, May 2010.

both critical journalists and concerned scientists have openly raised criticism. For instance, Nguyen The Hung, a Danang Polytechnics University professor, publicly accused the poor operation of the plants for causing ''all the heavy floods in the region lately'' (LAV 2009b), thus confronting provincial government interests and taking a bold stance in the domestic climate change debate.[17]

A separate and far more sensitive issue is the large-scale displacement of the natural inhabitants of the forest—the ethnic minorities (mainly Xo Dang, Co Tu, and Co)—when new dams and reservoirs are constructed, or when rubber and coffee plantations are established (Vietnam has also become a main exporter of coffee) (Doutriaux et al. 2008). During the last 10 years, ethnic minorities have been relocated on a massive scale in Quang Nam and few groups are unaffected. The ethnic minorities now consistently belong to the poorest segment of the population (VASS 2011), and being mostly shifting cultivators they generally do not have legal rights to their lands. When they are shifted to new areas they may be assigned land to cultivate, but are forbidden to practice shifting cultivation and seldom obtain legal rights to the land. Decreasing incomes and food shortages often result (LAV 2009d; Doan 2011). Thus they remain marginal citizens for whom lacking social and political leverage enhance their vulnerability. Complaints are massive and according to NGOs and independent surveys, hydropower resettlement generally does not meet the requirements ''to ensure people's life equal to or better than the former place'' (http://www.forum-adb.org/inner.php?sec=4&id=255&b=1). Promised compensations often fail and their livelihoods may be seriously eroded by the lower quality of compensation land. Adding to pressure is the gradual influx of Vietnamese majority population on their lands: either farmers moving in from high-population-density areas or new entrepreneurs seeking opportunities for buying land and doing business in mountain regions.

7. Land management and corruption

The issue of corruption in land management, disaster relief, foreign aid, and climate change projects has not received the same attention in Vietnamese government-led initiatives as by foreign donors and NGOs. Despite its negative impact, government authorities have not fostered potentially corruption-reducing mechanisms, such as protection of people who report corruption or an ''independent'' press or judiciary (Le 2010).[18] Cash handouts in particular—such as after disasters, as land compensation, or before Tet holidays—are in constant danger of being pocketed by corrupt local officials (e.g., Overland 2009; WB 2010b). Any type of relief work, irrespective of the source of funding, must be administered by local government.

One recent report on corruption out of many (WB 2010b) states that current land policies make land-related corruption a huge and increasing source of profit—for example, the policy to revoke land while setting compensation prices lower than market prices.[19] The procedures to acquire land certificates are also very troublesome and time consuming (amply confirmed by field work), thus encouraging people to bribe officials. This presents a particular problem to the poor and vulnerable population groups, which do not have the means for this practice and then tend to lose out in the ongoing quest for land rights; this is a hugely important factor in land concentrations.[20] Local fieldwork only confirmed the enormous problems of resource allocation at local levels, including disaster relief and aid. Allegations of misappropriation were so pervasive and substantial that they could not be ignored, indicating how corruption drains society of vital resources.

8. Conclusions

Obviously more local and comparative studies are desired to expose the aggregate impacts of ''external'' climate disruptions and ''internal'' social, economic, and political processes that structure vulnerabilities. It was here found that new economic opportunities are eagerly embraced and create new wealth for many, not least by means of land, resource, and capital concentrations. However, new entrepreneurs engage in high-risk economic activities, frequently in a boom-and-bust fashion and gambling with weather factors, simply because it pays off. Even if higher losses are sustained when typhoons strike, potential profits are huge, particularly for the new export-driven crops, and production costs,

[17] Criticism of unplanned hydropower construction is mounting nationwide in Vietnam, accusing it of devastating the living environment and causing ''artificial calamities'' (e.g., VNN 2011), even official media now call for stricter assessment (VNNews 2011).

[18] Vietnam has during several years been ranked around no. 120 of 178 countries by Transparency International and it presently ranked no. 165 of 178 by Reporters Without Borders, which includes Vietnam in the list of the 10 worst Internet enemies.

[19] They are mostly just a fraction; as an example from the survey, a household was offered a compensation of $10/m2 for beach land with an estimated market price of $100–200/m2.

[20] Repeated field studies over several years have revealed ever increasing land holdings of a few, as reported by local people. A recent record is two entrepreneurs in Nui Thanh district, each allegedly having accumulated over 60 ha of forest, making use of bribery to local government and ethnic minority straw men to get access to restricted areas.

including salaries, are very low by international standards. Thus, higher overall losses due to hazards need not be linked to either climate change or social vulnerabilities, but may just indicate economic opportunities being pushed to the limit.

For the time being, the balance of the evidence suggests that while climate disruptions are still inconclusive to moderate in this part of Vietnam (under analysis by various parties), man-made environmental interventions are radical. Land uses are under transformation, new plantation forestry is spreading rapidly and replacing old forest, and massive hydropower construction has far-reaching effects on forests, river systems, and local inhabitants. It was found that in common land use and resource management in Quang Nam, environmental protection is wrought with problems and mostly losing out to economic exploitation. There is an urgent need to integrate environmental management with climate change measures, in practice as well as in theory,[21] not least for the sake of local communities and the protection of vulnerable population groups, which often exploit the most marginal of resources. ''Not every adaptation to climate change is a good one'' (Eriksen et. al. 2011, p. 7)—and the need to embark on a development pathway that works with a long-term climate objective and is both socially and environmentally sustainable seems all the more pertinent (Schipper 2007).

In accordance with theory, it was shown how social processes linked to Vietnam's transition generate new vulnerabilities. Among the ''root causes'' as delineated in the PAR model (Wisner et al. 2004, p. 7), the market–economic system has altered production, ownership, and employment structures and brought new opportunities to broad groups in society, but also dramatically increased social differentiation. Associated with power relations and the type of government, access to land and resources continues to change and tends to segregate the weaker households, groups, and communities. A range of ''dynamic pressures'' are evident, notably in a changing resource base (e.g., forests, river flows, and land use changes), population movements, lack of local economic opportunities, lack of protective institutions, and poor ethical standards. Finally, ''unsafe conditions,'' in the form of dangerous locations and infrastructure (relating to river systems, shabby housing, etc.), poor incomes, risky livelihoods, poor health, and insufficient disaster preparedness, will feed the progression of vulnerability. Groups and individuals are thereby pushed toward greater exposure, in a squeeze between unfavorable societal conditions and natural hazards.

As implied in theory, type of government matters. Despite a socialist label, the present government is seen to align itself with business and elite interests while giving free reign to the forces of globalization, at the same time clutching on to power. There is a low degree of basic protections such as land and civil rights and access to representation, leading to marginalization for certain groups. The pervasive impact of corruption on land management deprives a vital institution of its ability to protect rural people in the ongoing quest for land. As an end product, vulnerabilities tend not to be structured according to spatial factors, but instead to increase as inversely proportional to social status, the hierarchies of which move from urban to rural, from coastal to inland, and from national majority to ethic minority. Social vulnerabilities obviously increase where social protections abate. A further consequence of regime type is a lack of transparency in crucial social and environmental data, even obscuritism, which hinders reliable evaluations of cause and effect when natural hazards like typhoons and floods turn into disasters.

Much donor-driven literature on climate change in Vietnam has a propensity for technocratic approaches, addressing mitigation and adaptation as a separate field, independent of both environmental and socioeconomic change. Adding to this glitch is a tapered Vietnamese science culture, influenced by stakeholder ministries and with inadequate inputs from other stakeholders: vulnerable population groups, civil society, critical journalism, and independent academia (some of which promote alternative values in open societies). For those in power it tends to be ''politically expedient'' to address the technical factors in natural hazards, since addressing the social and economic factors may call for changes in the way power operates in society (Wisner et al. 2004, p. 7). A new agenda may therefore be to inject skepticism into the current debate on climate change measures in Vietnam, overly technocratic and modernist as it is.

Last, catching up from the introduction it is worth noting that global drives for scaled-up climate change funding to developing countries comes at a time when faith in conventional aid tends to be waning. Academic literature shows increasing skepticism, and many see the negative impacts such as corruption generation, responsibility evasion, and rentier-state syndromes overriding the positive contributions. Experience with the current political setup in Quang Nam province and the efficiency of government land use planning, aid programs, and disaster relief similarly raises questions on the immediate value of increased aid. We cannot afford

[21] A range of relevant foreign aid projects are now in the making, including Strategic Environmental Assessments for economic development, land use planning, hydropower construction, etc. in Quang Nam.

not to be realistic: a conventional mix of good intentions and transfer of international funding is no guarantee for healthy adaptation. Climate aid is itself at risk of becoming a new industry, closely resembling the conventional ''aid industry'' (e.g., Dichter 2007), with a greater chance of benefitting state and elite interests (e.g., infrastructure works, coastal breakwaters, dikes and protections for urban and industrial areas, and protection infrastructure combined with land speculation) than the interests of those vulnerable population groups that it should be an imperative to protect (Adger 2007, p. 108), Presently Vietnam may be seen to ''take a climate chance'' (Fortier 2010), and many present practices may best be described as maladaptive.

It is still evident that Vietnam only played a small part in creating the problems of global environmental change that now begin to affect the country (e.g., Oxfam 2008; Waibel 2008, p. 26), and should receive due support. But it does play a dominant part in the massive social and environmental changes that now affect the lives of local people in central Vietnam. Essentially, Vietnam has exposed itself to domestic and global capitalism—generating high growth rates and new wealth—but without having social and environmental protection mechanisms in place: there is a separate bill for that to be paid.

REFERENCES

ADB, 2008: SEA of the Quang Nam Province hydropower plan for the Vu Gia-Thu Bon River Basin. ICEM Final SEA Rep. TA 4713-VIE, 206 pp.

——, 2009: *The Economics of Climate Change in Southeast Asia: A Regional Review*. ADB, 223 pp.

——, 2010: Involuntary resettlement and indigenous peoples assessment and measures. Song Bung 4 Hydropower Project, Resettlement and Ethnic Minority Development Plan Project 36352, 126 pp.

Adger, W. N., 1998: Indicators of social and economic vulnerability to climate change in Vietnam. CSERGE Working Paper GEC 98-02, 39 pp.

——, 2007: Governments, responsibilities, barriers and actors in adaptation for climate change. *Coping with Climate Change: National Summit Proceedings,* R. Bierbaum, D. Brown, and J. McAlpine, Eds., University of Michigan, 108–116.

Brown, M., cited 2012: UN survey queries Vietnamese about corruption. [Available online at http://www.voanews.com/content/un-corruption-survey-in-vietnam-aims-to-give-power-to-the-people-150146465/369893.html.]

Bruun, O., and T. Casse, Eds., 2013: *On the Frontiers of Climate and Environmental Change: Vulnerabilities and aAdaptations in Central Vietnam.* Springer Verlag, in press.

Cafe, F., cited 2009: Quảng Nam hủy 9 dự án thủy điện (Quang Nam cancelled 9 hydropower projects). [Available online at http://cafef.vn/20091115074122955CA33/quang-nam-huy-9-du-an-thuy-dien.chn.]

Chaudhry, P., and G. Ruysschaert, 2007: Climate change and human development in Viet Nam. Human Development Occasional Papers (1992–2007), Human Development Report Office (HDRO), United Nations Development Programme (UNDP), Human Development Report Office Occasional Paper HDOCPA-2007-46, 18 pp.

Chaudhuri, S., J. Jalan, and A. Suryahadi, 2002: Assessing household vulnerability to poverty from cross-sectional data: A methodology and estimates from Indonesia. Columbia University Department of Economics Discussion Paper 0102-52, 25 pp.

Cutter, S. L., C. T. Emrich, J. J. Webb, and D. Morath, 2009: Social vulnerability to climate variability hazards: A review of the literature. Hazards and Vulnerability Research Institute Final Rep. to Oxfam America, 44 pp.

Dichter, T. W., 2007: *Despite Good Intentions: Why Development Assistance to the Third World Has Failed.* University of Massachusetts Press, 303 pp.

Doan, T., 2011: Livelihoods for resettled communities. CRBOM Small Publications Series 36, 9 pp. [Available online at www.crbom.org/SPS/Docs/SPS36-Livelihoods.pdf.]

Doutriaux, S., C. Geisler, and G. Shively, 2008: Competing for coffee space: Development-induced displacement in the central highlands of Vietnam. *Rural Sociol.,* **73,** 528–554.

DTInews, cited 2011: Vietnam raises poverty line. [Available online at http://www.dtinews.vn/en/news/017002/7528/vietnam-raises-poverty-line.html.]

EIA, 2008: Borderlines: Vietnam's booming furniture industry and timber smuggling in the Mekong Region. EIA/Telapak, 21 pp.

Eriksen, S., and Coauthors, 2011: When not every response to climate change is a good one: Identifying principles for sustainable adaptation. *Climate Dev.,* **3,** 7–20.

Fortier, F., 2010: Taking a climate chance: A procedural critique of Vietnam's climate change strategy. *Asia Pac. Viewpoint,* **51,** 229–247.

Gaillard, J.-C., C. C. Liamzon, and J. D. Villanueva, 2007: 'Natural' disaster? A retrospect into the causes of the late-2004 typhoon disaster in Eastern Luzon, Philippines. *Environ. Hazards,* **7,** 257–270.

Ha, T. V., 2007: *Land Reform and Rural Livelihoods: An Examination from the Uplands of Vietnam*. Shaker Verlag, 362 pp.

Hewitt, K., Ed., 1983: *Interpretations of Calamity: From the Viewpoint of Human Ecology*. The Risks and Hazards Series, Vol. 1, Allen and Unwin, 304 pp.

Huan, V., L. H. Anh, M. T. Tan, N. T. B. Tram, and P. T. An, 2010: Modelling relationship between climate change and landslide in Quang Nam, Vietnam. Vietnam Academy of Science and Technology Project P1-08Vie, 111 pp.

ISPONRE, 2009: Viet Nam assessment report on climate change. Institute of Strategy and Policy on Natural Resources and Environment Rep., 110 pp.

LAV, cited 2008: Gold mining pollution poisoning Bong Mieu River. [Available online at http://www.lookatvietnam.com/2008/12/gold-mining-pollution-poisoning-bong-mieu-river.html.]

——, cited 2009a: Minister says central highlands dams depleting resources. [Available online at http://www.lookatvietnam.com/2009/11/minister-says-central-highlands-dams-depleting-resources-2.html.]

——, cited 2009b: Central hydropower plants worsen floods: Experts. [Available online at http://www.lookatvietnam.com/2009/12/central-hydropower-plants-worsen-floods-experts.html.]

——, cited 2009c: Deputy minister blames reservoirs for worsening floods. [Available online at http://www.lookatvietnam.com/2009/10/deputy-minister-blames-reservoirs-for-worsening-floods.html.]

——, cited 2009d: Dams leave farmers landless and hungry. [Available online at http://www.lookatvietnam.com/2009/12/dams-leave-farmers-landless-and-hungry.html.]

——, cited 2011: Nation develops plan to mitigate climate change. [Available online at http://www.lookatvietnam.com/2011/05/nation-develops-plan-to-mitigate-climate-change.html.]

Le, L. S., cited 2010: Vietnam's endless corruption campaign. [Available online at http://www.eastasiaforum.org/2010/04/16/vietnams-endless-corruption-campaign/.]

McElwee, P., and Coauthors, 2010: The social dimensions of adaptation to climate change in Vietnam. The World Bank Discussion Paper 17, 137 pp.

MF/WB, 2005: Fisheries and aquaculture sector study. Ministry of Fisheries and The World Bank Final Rep., 141 pp.

MONRE, 2007: National Target Program to Respond to Climate Change. Ministry of Natural Resources and Environment Rep., 111 pp.

——, 2009: Climate change: Sea level rise scenarios for Vietnam. Ministry of Natural Resources and Environment Rep., 33 pp.

Moser, C., 1998: The asset vulnerability framework: Reassessing urban poverty reduction strategies. *World Dev.,* **26,** 1–19.

Nguyen, B. N., N. Q. Tan, W. D. Sunderlin, and Y. Yasmi, 2009: Forestry and poverty data in Viet Nam: Status, gaps, and potential uses. RECOFTC, RRI, and VFU, 85 pp.

Nguyen, V., 2011: Climate change and agricultural production in Vietnam. *The Economic, Social and Political Elements of Climate Change,* W. L. Filho, Ed., Springer-Verlag, 227–243.

O'Brien, K. L., and R. M. Leichenko, 2000: Double exposure: Assessing the impacts of climate change within the context of economic globalization. *Global Environ. Change,* **10,** 221–232.

Overland, M. A., cited 2009: Corruption undermines Vietnam's stimulus program. [Available online at http://www.time.com/time/world/article/0,8599,1881227,00.html.]

Oxfam, 2008: Vietnam: Climate change, adaptation and poor people. Oxfam Research Rep., 56 pp.

Painter, M., 2005: The politics of state sector reforms in Vietnam: Contested agendas and uncertain trajectories. *J. Dev. Stud.,* **41,** 261–283.

Pham, V., 2011: *Recognizing and Reducing Corruption Risks in Land Management in Vietnam*. National Political Publishing House, 75 pp.

Quang, V. N., 2010: Studying the impacts of climate change on eco-agriculture in different landscapes in the study area. *Workshop on P1-08 Vie Project,* Tam Ky City, Vietnam, Danida, 10 pp.

Quang Nam Statistics Office, 2009: *Quang Nam Statistical Yearbook*. Statistical Publishing House, 350 pp.

Schipper, E. L. F., 2007: Climate change adaptation and development: Exploring the linkages. Tyndall Centre for Climate Change Research Working Paper 107, 13 pp.

Shanahan, M., C. Thornton, S. Trent, and J. Williams, 2004: Risky business: Vietnamese shrimp aquaculture—Impacts and improvements. Environmental Justice Foundation Rep., 41 pp.

Son, L. D., U. Lien, and R. McGowan, 2009: Climate change adaptation survey: Quang Nam Province, Central Region, Vietnam. East Meets West Foundation Rep., 45 pp.

Sperling, F., Ed., 2002: Poverty and climate change: Reducing the vulnerability of the poor through adaptation. African Development Bank et al., 43 pp.

SRV, 2008: Decision on approval of the National Target Program to respond to climate change. The Prime Minister 158/2008/QD-TTg, 22 pp.

Swinkels, R., and C. Turk, 2006: Explaining ethnic minority poverty in Vietnam: A summary of recent trends and current challenges. CEM/MPI Meeting on Ethnic Minority Poverty Background Paper, 20 pp.

Thuong, H. V., H. T. M. Thu, and B. Long, 2005: Community forest management and protection on Quang Nam province. WWF MOSAIC Project, 14 pp.

VARG, 2006: Linking climate change adaptation and disaster risk management for sustainable poverty reduction. Vulnerability and Adaptation Resource Group/European Union Synthesis Rep. MWH 475000177.001-6 rev. 1, 30 pp.

VASS, 2011: *Poverty Reduction in Vietnam: Achievements and Challenges*. Thế Giới, 65 pp.

VBN, cited 2010: Shrimp die, farmers in dire straits. [Available online at http://businesstimes.com.vn/shrimp-die-farmers-in-dire-straits/.]

——, cited 2011: Committed ODA amount for 2011 may fall. [Available online at http://vietnambusiness.asia/committed-oda-amount-for-2011-may-fall/.]

VE, cited 2011: Climate change plan is vital for Viet Nam. [Available online at http://sustainasia.wordpress.com/2011/05/16/climate-change-plan-is-vital-for-viet-nam/.]

VFN, cited 2010: Donors pledge aid to Vietnam but warn of corruption. [Available online at www.monstersandcritics.com/news/business/news/article_1604259.php.]

VNN, cited 2011: The thirst for hydropower devastating living environment. [Available online at http://english.vietnamnet.vn/en/environment/12061/the-thirst-for-hydropower-plants-devastating-living-environment.html.]

VNNews, cited 2011: Dam projects require stricter assessments. [Available online at http://vietnamnews.vnagency.com.vn/Environment/214146/dam-projects-require-stricter-assessments.html.]

Waibel, M., 2008: Implications and challenges of climate change in Vietnam. *Pacific News,* No. 29, University of Hamburg, Hamburg, Germany, 26–27.

WB, cited 2010a: Vietnam: Economics of adaptation to climate change. [Available online at http://climatechange.worldbank.org/content/vietnam-economics-adaptation-climate-change-study.]

——, cited 2010b: Improving the institutional capacity for water pollution control in Vietnam. [Available online at http://go.worldbank.org/OJ5P01IVL0.]

WEPA, cited 2011: State of water environmental issues: Viet Nam. [Available online at http://www.wepa-db.net/policies/state/vietnam/overview.htm.]

Wisner, B., P. Blaikie, T. Cannon, and I. Davis, 2004: *At Risk: Natural Hazards, People's Vulnerability and Disasters*. 2nd ed. Routledge, 496 pp.

Zink, E., 2011: Flexible science: An anthropology of scientists, society and nature in Vietnam. Ph.D. dissertation, Uppsala University, 253 pp.