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Sustainable livelihoods and people's vulnerability in the face of coastal hazards

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Abstract The present study investigates into the link between people's vulnerability in the face of coastal hazards and sustainable livelihoods. It focuses on the town of Borongan in the Philippines and draws on questionnaire-based surveys and focus group discussions. This research shows that local fishermen are often compelled to go out fishing despite pending typhoon or storm surge to sustain the daily needs of their family. Its also demonstrates that the capacity of these people to protect themselves from the threat is constrained by poor and fragile livelihoods. In the event of a crisis, the study argues that people resort to a range of adjustments on their daily life which is rooted in the strength and diversity of their livelihoods. To reduce people's vulnerability and enhance capacities to face coastal hazards, the study fosters Community-Based Disaster Risk Reduction with special emphasis to sustainable livelihoods.

Keywords Coastal hazards · Vulnerability · Capacity · Sustainable livelihoods · Philippines

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Introduction

Natural hazards and their impact on human societies are often considered out of the regular social fabric. Scientists, institutions, governments and media often mention 'extra-ordinary' and 'un-certain' phenomena, 'un-expected' disasters, 'un-scheduled' and 'un-anticipated' damage that affect regions which are 'under-developed', 'over-populated', 'un-informed', 'un-prepared', 'un-planned'. In consequence, measures planned to prevent disaster are geared toward the extreme dimension of natural phenomena and include specific, technocratic, command-and-control measures such as engineering structures, land-use planning and hazard awareness campaign. This is the dominant approach of disasters or "paradigm of the extreme" (Hewitt 1983; Gaillard 2007). A sharp increase in the number of disasters worldwide between the first and second half of the 20th century (Centre for Research on Epidemiology of Disasters 2008; Corporación OSSO and La Red de Estudios Sociales en Prevención de Desastres en América Latina 2008) shows that this strategy failed in its objective to reduce the occurrence of disasters.

The dominant approach largely failed because it does not consider the real causes of disasters which lie in the 'normal', everyday functioning of the society. Victims of disasters are indeed disproportionately drawn from the segments of the society which are marginalized in daily life (Wisner 1993; Wisner et al. 2004; Gaillard 2007). Disaster

victims are marginalized geographically because they live in hazardous places, socially because they are members of minority groups, economically because they are poor, and marginalized politically because their voice is disregarded by those with political power. Marginalization usually leads to high vulnerability and low capacity in facing natural hazards. Vulnerability and capacity are two key concepts which have emerged during the last three decades. Vulnerability refers to the propensity to suffer from damage should natural phenomena occur (adapted from D'Ercole 1998) or, in other terms, the condition of a society which makes it possible for a hazard to become a disaster (Cannon 1994). On the other hand, capacity refers to the resources and assets people possess to resist, cope with and recover from disaster shocks they experience (Davis et al. 2004).

A set of indicators reflects the vulnerability of disaster victims (Cannon 1994). They frequently comprise women, children, elderly, disabled individuals, refugees, prisoners. Disasters also hit individuals with limited and fragile incomes (low wages, informal jobs, lack of savings) that reduce the capability to protect one's self in the face of natural hazards (location of home, type of housing, knowledge of protection measures). Vulnerability also results from inadequate social protection (health insurance, health services, construction rules, prevention measures, etc.) and limited social capital (solidarity networks). Vulnerability is further rooted in a deep tangle of structural, hazard-independent, constraints which include the access to livelihoods, historical and cultural heritages and the political economy context (Watts and Bohle 1993; Wisner et al. 2004; Gaillard 2007). If vulnerability and capacity cannot always be considered as two ends of a spectrum (Davis et al. 2004), people's ability to face hazards and disasters often conversely rely on strong and sustainable livelihoods, traditional knowledge, social capital and institutional support. Ways to reduce people's vulnerability and enhance their capacity to face natural hazards emphasize community participation and underline local contexts and everyday life (Anderson and Woodrow 1989; Maskrey 1989; Delica-Willison and Willison 2004).

The present paper explores people's vulnerability and capacity in the face of natural hazards with a special mention to livelihoods. It will focus on a small coastal community of the Philippine archipelago, named Borongan, on the island of Samar. "A short background on sustainable livelihoods" will briefly review the literature on sustainable livelihoods. "Introducing the study area" will introduce the study area while "Methodology" will present the methodology used for the study. "Livelihoods and exposure to natural hazards", "Livelihoods and protection in the face of natural hazards" and "Livelihood and capacity to cope with crises" will eventually show why access to livelihoods is crucial in understanding how the people of Borongan face coastal hazards. The final section will discuss how sustainability and daily life interplay with disasters.

A short background on sustainable livelihoods

The concept of livelihood emerged in the late 1980s as an alternative to the technocratic concept of 'employment' to better describe how people struggle to make a living (Scoones 2009). It emphasizes people's view of their own needs. Chambers and Conway (1991, p. 1) define sustainable livelihoods as follow:

'A livelihood comprises people, their capabilities and their means of living, including food, income and assets. Tangible assets are resources and stores, and intangible assets are claims and access. A livelihood is environmentally sustainable when it maintains and enhances the local and global assets on which livelihoods depend, and has net beneficial effects on other livelihoods. A livelihood is socially sustainable which can cope with and recover from stress and shocks, and provide for future generations.'

Livelihoods thus refer to the means and capacities required to sustain durably people's basic needs. Basic needs are vitally linked to food, but also include shelter, clothing and social relations. The capacity to meet food and other basic needs depends on assets or capitals. Scoones (1998) and eventually the United Kingdom Department For International Development (1999) distinguish five types of capitals: natural capital (land, water, forest, air and other natural resources), human capital (health, skills and knowledge), social capital (kinship, social networks, and associations), financial capital (cash, saving, credit, jewellery and other valuables) and physical capital (housing, infrastructures, work implements, livestock and domestic utensils). The extent, strength and diversity of capitals condition people's capacity to produce their own food. It also commands the capacity to purchase food should it is not supplied by the household itself. In the latter case, the availability of food depends on the larger political economy framework (Start and Johnson 2004). The availability and extent of capitals or assets is indeed deeply dependent on claims and access. Claims refer to rights and capacities/power to ask for some external support to sustain basic needs should people cannot meet them by themselves. Claims thus depend on the extent of people's social, economic and political networks and relationships. It is complemented by access which is the opportunity to use available stores and resources or obtain food, employment, technology and information (Chambers and Conway 1991). As underlined by Sen (1981a, b) and Watts and Bohle (1993), people's claims for and access to livelihoods thus go beyond the specific availability or unavailability of livelihoods but encompass the capability or entitlement to

use available resources. They reflect class relationships and the larger distribution of economic wealth, social opportunities and political power within the society.

Livelihoods rarely refer to a single activity. It includes complex, contextual, diverse and dynamic strategies developed by households to meet their needs (Chambers 1995; Scoones 1998, 2009). Diversity and dynamics are crucial to ensure livelihood sustainability. The sustainability of livelihoods has often been associated with the concept of vulnerability when dealing with poverty and famine shocks (Devereux 2001, 2006; Start and Johnson 2004). Enhancing livelihood sustainability emphasizes five areas of focus: creation of working days, poverty reduction, well-being and capabilities, livelihood adaptation, vulnerability and resilience, natural resource base sustainability (Scoones 1998). Strategies to enhance livelihood sustainability should thus be people-centred, multi-level and holistic, dynamic and sustainable (Department For International Development 1999).

The sustainable livelihood approach emerged from the concept of sustainable livelihoods. It is being widely used by government agencies and NGOs to foster development both in urban and rural settings (*e.g.* Chambers and Conway 1991; Scoones 1998; Department For International Development 1999; Devereux 2001). It has then been expanded to the understanding and resolution of armed conflicts (*e.g.* Longley and Maxwell 2003; Korf 2004; Lautze and Raven-Roberts 2006). It is now applied to people's vulnerability in the face of natural hazards and post-disaster reconstruction (*e.g.* Sanderson 2000; Twigg 2001; Cannon 2003; Cannon et al. 2003; Wisner et al. 2004; Kelman and Mather 2008). If there is a good deal of references providing case studies in the aftermath of disasters, especially following the 26 December 2004 Indian Ocean tsunami (*e.g.* Oxfam 2005; Alexander et al. 2006; Coate et al. 2006; Pomeroy et al. 2006; Régnier et al. 2008), few researches document how livelihoods interplay with people's vulnerability and capacity in the face of natural hazards. The present study is an attempt to fill this gap.

Introducing the study area

The Philippines is known as one of the most disaster-prone countries in the world. Between January 1900 and May 2006, the EMDAT database of the Centre for Research on Epidemiology of Disasters (CRED) listed 379 disasters that each killed at least more than ten people, hindered the life of more than 100 individuals, or required international aid (Centre for Research on Epidemiology of Disasters 2008). These events caused economic damages worth USD 7 billion and killed more than 48,000 people. Millions of other Filipinos were directly or indirectly affected. A non-exhaustive list of disastrous events for the past 3 years includes landslides and floods which killed 1,500 people in eastern Luzon in late 2004, a huge landslide which claimed more than 1,000 lives in the southern part of Leyte island in February 2006, typhoon Milenyo which killed around 2,000 people in September 2006 and Typhoon Reming which caused the death of almost 1,500 people in December 2006.

Most of these disasters struck poor rural and coastal regions of the Philippines. The reasons for the vulnerability of rural and coastal areas have been widely documented in the literature. Researches constantly refer to difficult access to land and resources (Anderson and Woodrow 1989; Crittenden et al. 2003; Heijmans 2004; Gaillard et al. 2008), class and power relationships (Danguilan-Vitug 1993; Mahmud 2000; Huigen and Jens 2006), population dynamics (Termelo 1997; Gaillard et al. 2007), historical and cultural heritages (Bankoff 2003; Gaillard 2008) and insufficient social protection (World Bank et National Disaster Coordinating Council 2004; Delfin and Gaillard 2008). On the other hand, Bankoff (2003), Luna (2003) and Gaillard et al. (2008) emphasize endogenous coping mechanisms which reflect capacities to face the threat and the occurrence of natural hazards. These are rooted in social ties, religious beliefs, traditional knowledge, structural adjustments to the threat, and diet modification.

The present study focuses on the small town of Borongan. It is located on a narrow coastal plain between a small bay of the Pacific Ocean and the karstic hills of central Samar Island (Fig. 1). The area is known for the acuity of environmental issues which include massive deforestation, decrease in mangrove cover and depletion of coral resources. In 2007, Borongan population reached 59,354 inhabitants distributed on an area of 451 km^2 or a density of 132 people/km^2 (National Statistics Office 2008). Borongan is the capital of the province of Eastern Samar. This province is one of the poorest in the Philippines. The Human Development Index (HDI) was estimated at 0.511 in 2000 (versus 0.625 for the entire country) and the Gross Domestic (GDP) per capita is less than 200 US$ per year. Overall, 47% of the population lives below the poverty line set for the province. The vast majority of the population of Eastern Samar (74% in 1997) and Borongan relies on fishing and farming to sustain its daily needs (Eastern Samar Provincial Planning and Development Office 2004).

The entire municipality of Borongan is threatened by landslides, flooding, flash floods, cyclones, earthquakes, tsunamis and storm surges (or 'dulok' in native Waray language). Tropical cyclones are particularly frequent in the area and strike almost all over the year (Philippine Atmospheric, Geophysical and Astronomical Service Administration 2005). In 1984, cyclone Undang battered the central part of the Philippine archipelago, including Borongan, and left more than 1,000 people killed in its

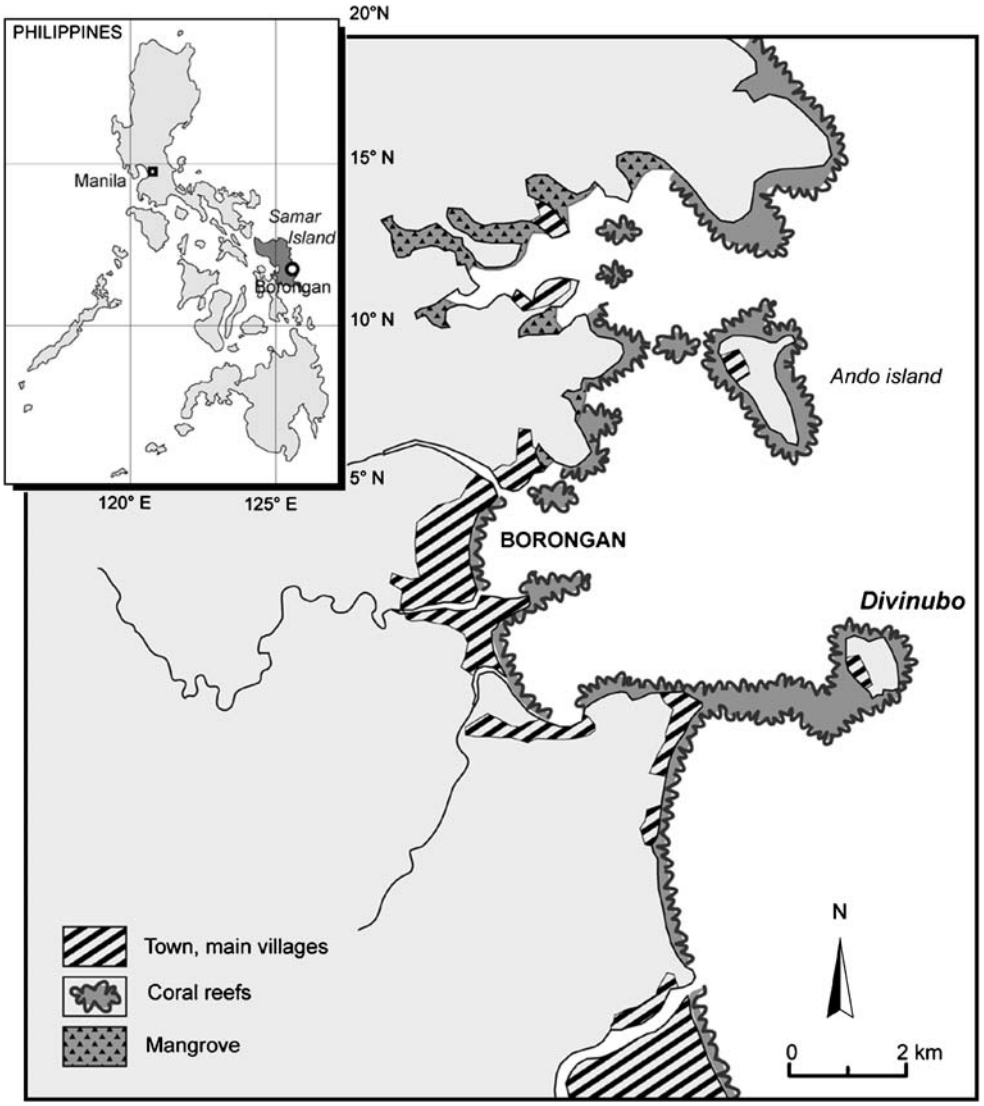

Fig. 1 Location of Borongan on the island of Samar in the Philippines

path. In 1988, cyclone Yuning swept Samar and the rest of the country and caused the death of 300 people (Centre for Research on Epidemiology of Disasters 2008). Storm surges are yearly events which hit Borongan during the local rainy season between December and May. Rainy season is known as 'amihan', from the eponym north-eastern trade winds. In early February 2008, Borongan and the rest of Eastern Samar were badly affected by landslides and flooding which forced the evacuation of hundreds of families (Labro and Gabieta 2008).

Methodology

This study relies on field work conducted in Borongan in three successive stages between 2005 and 2007.

An exploratory series of interviews with key informants has been carried out in June 2005 to identify stakeholders of resource management in Borongan. Interviewees included representatives from the different agencies of the municipal and provincial governments, and local scholars.

In May 2006, a questionnaire-based survey was conducted among households which main livelihoods rely on farming and fishing. The survey aimed to document people's livelihoods pattern and strategies, with special respect to environmental changes such as deforestation, mangrove destruction and coral reef depletion. 12 villages were selected among Borongan 61 *barangays* (the smallest administrative unit in the Philippines). These include six coastal villages and six inland settlements which were representative of the entire municipality in terms of geographical distribution (along roads, along the shore, near estuaries, upstream, downstream, isolated location, and insularity). Within each village, 20% of the households were surveyed randomly. Overall, 399 families were surveyed: 259 among coastal villages and 140 among

inland settlements. Two different 40-item questionnaires were used for farmers and fishermen. The survey was conducted through the use of the local Waray language. It is noteworthy that the following sections will limit to data pertaining to fishing households.

In August 2006, another series of interviews with key informants explored people's and institutional vulnerability in the face of natural hazards. The interviews covered representatives from the Borongan Municipal Disaster Coordinating Council, the Municipal Planning and Development Office, the Community Social Welfare and Development Office, the Department of Interior and Local Government, the Department of Agriculture and Tourism Office. At the provincial level, interviews were conducted with informants from the Eastern Samar Provincial Disaster Coordinating Council, the Provincial Tourism Office, the Provincial Planning and Development Office and the Department of Environment and Natural Resources. Additional interviews were carried out with leaders of people's organizations and other members of island, coastal, inland and mountain communities.

In August and September 2007, a second smaller questionnaire-based survey was conducted among 50 of the 132 households of the small island of Divinubo, off the shore of the Borongan town proper. It specifically explored the links between livelihoods and people's vulnerability and capacity to face coastal hazards. This second survey was completed by three successive Focus Group Discussions (FGDs) with members of the local People's Organization (PO). FGDs provided hazard profiles, livelihoods patterns and coping strategies. The island of Divinubo was chosen because it is one of the areas of Borongan which is the most threatened by natural hazards. It is further largely dependent on fishing and farming resources.

Field work was completed by the collection of primary and secondary written documents such as journal publications, conference proceedings, and relevant press clippings from regional and national newspapers. Both primary and secondary written materials provided information mostly on disaster management and resource management policies.

In Borongan, the surveys and FGDs conducted in 2006 and 2007 show that the strength, diversity and sustainability of livelihoods are crucial in understanding 1/ people's exposure to natural hazards, 2/ people's fragility in the face of natural hazards, and 3/ people's capacity to cope with crises.

Livelihoods and exposure to natural hazards

In Borongan, the first and foremost victims of cyclones and storm surges are households which depend on fishing as livelihood. When the weather is bad, fishermen cannot go out fishing and thus sustain the daily needs of their family. Indeed, the capacity to purchase rice, the food staple, depends on selling enough fishes. Only 22% of the fishermen actually keep fish catches for their own consumption. In parallel, there are barely 39% of the fishermen who may rely on other resources, mainly farming (46% of them) and contractual jobs as carpenter or construction worker. 43% of the fishermen are engaged in deep-sea fishing. 37% practice intertidal zone fishing. 15% collect seashell and other molluscs during low tide.

To sustain the increasing needs of a growing population (+2.72% between 1995 and 2000), Borongan fishermen acknowledge that they hence go out fishing even during bad weather and heavy swell. Beyond population growth, fishermen have to face a depletion of marine resources. Almost 40% of the fishermen surveyed acknowledge that their fish catch decreased during the last decades. The depletion of marine resources was caused by the massive use of cyanide and dynamite in the 1970s and 1980s. Cyanide and dynamite were largely used to ease and increase fish catch, especially within the intertidal zone. While a large majority of fishermen does not use these techniques any more, most of them suffer from the destruction to coral reefs and the lingering diminution in fish shoals. The parallel regression of the coastal forest cover, especially the mangrove, also affected fish reproduction areas (Mendoza and Alura 2001). The sharp increase in the price of gasoil (quoted by 6% of the interviewees), a serious decrease in the value of fishes on local markets (noted by 21% of those surveyed), solid waste pollution and competition with industrial fishing vessels from Taiwan serve as additional constraints which push fishermen to nowadays risk their life during bad weather.

Conversely to other studies in the Philippine setting (*e.g.* Heijmans 2004; Gaillard et al. 2007), it is noteworthy that access to land does not prove to be a major issue in terms of exposure to natural hazards in Borongan.

Livelihoods and protection in the face of natural hazards

When they choose to face cyclone and storm surges, Borongan fishermen are highly vulnerable because fishing implements prove to be fragile. Most of deep-sea fishermen go out on a weekly basis and rely on motorized outrigger boats with harpoons, nets and lines to catch tunas, mackerels and marlins (Fig. 2). Only 18% of these fishermen own the boat they use. This means that part of the fish catch (often 25%) has to be turned over to the owner of the boat based on conditions imposed by the later. The rest, along with expenses inherent to the use of the

Fig. 2 Motorized outrigger boat used for deep-sea fishing in Borongan, Philippines. Here it is further used for transporting copra (photograph by JC Gaillard, August 2006)

boat, is shared by the fishermen who are often tied by kinship or friendship. Deep-sea fishing is the most profitable activity but the most vulnerable as well. According to informants from the Department of Social Welfare and Development, accidents are getting more frequent nowadays. In 2005, ten fishermen lost their life in two different wrecks. Reasons for these accidents include the intrinsic fragility of the boats, their overuse and their insufficient maintenance due to financial constraints.

People engaged in intertidal zone fishing dive from small non-motorized outrigger boats. They use harpoons and nets and they usually own the boat they use. These fishermen use to go out daily. During the rainy and cyclonic season, many deep-sea fishermen have to fall back on intertidal-zone fishing to sustain the needs of their family and modulate their activity according to hazardous climatic conditions.

Fishing on foot and seashell and mollusc gathering is widespread during low tides. It relies on rudimentary implements such as fishing lines, fish nets, hoop nets and pots. Women and children often join their husbands and fathers. Fishing on foot is the less vulnerable in the face of natural hazards. However, it is the less profitable way of fishing too.

Vulnerability in facing coastal hazards also depends on fragile housing. In 2000, most of the houses of Borongan were made of bamboo and palm leaves which often turn out to be weak when confronted to strong winds. Only 20% of the houses were built in sturdy materials (cement and hallow blocks). 26% were made of wood (especially in the interior and mountainous part of the municipality) and 15% were mixed wood and cemented structures (Borongan Municipal Planning and Development Office 2005). On the small island of Divinubo, off the shore of Borongan, 59% of the houses are built in bamboo and palm leaves (Fig. 3). In the event of an impending cyclone, almost one third of the surveyed households reinforce the roof and walls of their fragile dwelling with fish nets. The capacity to build a strong house or to purchase additional fish nets to strengthen bamboo and palm leaves homes basically depend on the availability of cash and savings.

Livelihood and capacity to cope with crises

When cyclone and storm surges affect their small island, the people of Divinubo are left isolated and cannot rely on any external aid. The inhabitants of Divinubo thus have to rely on endogenous coping strategies to sustain their daily needs, especially food (Table 1). Coping strategies refer to 'the manner in which people and organisations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster phenomenon or process' (United Nations Development Programme 2004, p. 135). 76% of the households surveyed as part of this study modify their diet by integrating more vegetables, root crops (notably cassava) and fruits. They thus eat less rice, fish and meat. 69% of the people further resort to rationing strategies and reduce the quantity of food they eat during each meal. 59% skip one meal and usually eat at 10 AM and 5 PM daily. 71% of the families try to save food in prevision of the cyclone and storm surge season. 71% cancel or postpone the celebration of ceremonies such as birthdays, anniversaries and christenings. Wedding are seldom scheduled during rainy seasons.

The second series of measures adopted by the people of Divinubo deal with the financial capacity to purchase food

Fig. 3 Traditional house made of bamboo and palm leaves on the island of Divinubo, Borongan, Philippines (photograph by JC Gaillard, August 2006)

Table 1 Measures adopted by the people of Divinubo in the face of crises brought by natural hazards (*n=50*)

Coping strategies	Percentage of people adopting this measure
Pray more often	100%
Evacuate temporarily	86%
Reduce daily expenses	78%
Change diet	76%
Save food in prevision of rainy season	71%
Loan money	71%
Cancel special occasion (anniversary, christening, etc.)	71%
Reduce food intake for each meal	69%
Postpone debt repayment	63%
Reduce the number of daily meals	59%
Save money in prevision of rainy season	49%
Engage children in livelihood activities	31%
Engage in sideline activities (laundry, sewing, etc.)	24%
Pawn belongings	12%
Sell belongings	6%
Relocate temporarily	4%

and sustain other pressing needs. 78% of the households reduce their daily expenses for less urgent matters (clothes, children education, alcohol, cigarettes, gambling). 71% of the families surveyed also resort to loans, chiefly from kin and close friends. 63% of the people ask for a postponement in refunding existing loans. 49% of the households strive to save a little money at the advent of the rainy season. 31% of the families rely on extra incomes generated by their children or sideline activities (laundering, sewing, and ironing). A small number of people, respectively 6 and 12%, also have to sell or pawn some of their belongings such as their boat, nets, jewels or cellular phones.

In Divinubo, women play a very significant role in time of crisis. They are usually the one who engage in sideline income-generating activities in connection with their richer neighbours. They are also tasked with negotiating loans among their relatives and friends. Social networks are further activated when the people of Divinubo have to evacuate their home. Most of them acknowledge that they usually seek shelter from members of the family, close friends or neighbours. Religion also plays a key role as it does elsewhere in the Philippines (Bankoff 2003, 2004). 100% of the interviewees said that they pray more in time of crisis, probably in order to both mentally and socially cope with the tragedy and to ward off further events by appeasing deities. Finally, there is no medical doctor on the island and emergency are managed by three local women with basic first aid training.

The capacity to cope with crises largely depends on the strength and diversity of people's livelihoods. Households which incomes rely on the sole selling of fishing products are in great difficulty when fisherman cannot leave the island. However, only a small fraction (8%) of the families depends exclusively on fishing. Conversely to the people of Borongan town proper, a large majority of the households of Divinubo resort to different resources and usually combines fishing and farming (28% of the households surveyed). The interior of the island is indeed covered with coconut trees from which copra is extracted. However, only 50% of the coconut trees belong to the farmers who care for the land and who thus have to give up a significant share of their harvest to the land owners. Between 2004 and 2006, these farmers also had to cope with a dramatic decrease in the price of copra (from ~0.3 US$ to ~0.2 US$ per kilo). Selling copra ensure incomes four times a year. Below the coconut trees, the people of Divinubo usually plant small fruit trees, vegetables and root crops which provide additional food. Some families also raise pigs. When it is not combined with farming, fishing is complemented by small retailing stores, carpentry jobs and house chores. 12% of the households surveyed as part of this study further depend on remittances sent by relatives working abroad. Eco-tourism also provides additional but limited incomes to some of the inhabitants of the island.

Sustainability, daily life and disasters

Obviously, the nature, strength and diversity of livelihoods are crucial in defining people's vulnerability and capacity in facing coastal hazards. People whose livelihoods are sustainable in the face of natural hazards prove to be less vulnerable and equipped with capacities to face environmental shocks. This study of Borongan actually emphasizes

that assets and capitals essential in the sustainability of livelihoods are crucial in defining vulnerability too. People's ability to live in hazard-safe places depends on access to land (natural capital), yet not a major issue in Borongan but crucial elsewhere in the Philippines (*e.g.* Heijmans 2004; Gaillard et al. 2007). Skills and knowledge (human capital) enable the diversification of activities and thus lessen households' dependence on fishing in time of bad weather. Incomes and savings (financial capital) are obviously important to purchase food in time of scarcity but also to build resistant houses and to ensure the maintenance of fishing boats. Pawning of valuable belongings further allows to generate additional cash should required. Social networks and kinship (social capital) are critical in providing alternative support in time of crisis. Finally, the fragility of infrastructures (including housing) and fishing implements (including boats) does not provide safety to fishermen and their families. People's vulnerability can therefore not be dissociated from livelihoods sustainability. On the other hand, livelihood sustainability is similarly tied to people's vulnerability to natural hazards. As an example, deep-sea fishermen usually experience crisis beyond the impact of cyclones or storm surges as they have to face the need for expensive gasoil when weather conditions allow them to resume fishing activities after several days of unprofitable inactivity.

The concept of sustainability implies that basic needs are met on a quotidian basis. Considering everyday life is therefore crucial in understanding both livelihoods sustainability and vulnerability in facing natural hazards. Factors which determine both sustainability of livelihoods and vulnerability to natural hazards are similarly rooted in daily life. Borongan fishermen deliberately choose to go out fishing and face natural hazards to sustain the daily needs of their family. In fishermen's mind, the threat related to food insecurity weight heavier than the threat linked to natural hazards. In other words, risk perception of going out fishing despite bad weather was lower than the risk perception of not having enough to eat. Sustaining one's minimum food intake is indeed the human most basic need and is rooted in daily life. Threats to everyday needs, especially to food security, are almost always more pressing than threats from rare or seasonal natural hazards. Strategies to cope with cyclones and storm surges are also anchored in daily life. Most are adjustments in everyday activities of the affected people rather than extraordinary measures adopted to face extreme and rare natural events.

The inability to face natural hazards and the concurrent occurrence of disasters thus reflect weaknesses in daily life. The root causes of disasters lie in everyday, hazard-independent constraints that trap victims in permanent vulnerability rather than in the 'extraordinary' dimension of natural hazards. Disasters should thus be considered as the extension of permanent emergency situations and should not be considered as accidents in society (Hewitt 1983; Maskrey 1989; Wisner 1993). Natural hazards may thus be compared to a highlighter pen which emphasizes pre-existing mistakes in a manuscript. In other words, disasters ultimately reflect development failure. In that context, attributing the responsibility of disasters to Nature is just resorting to scapegoat.

Surprisingly, the still-dominant Western view on disaster management underscores the 'exceptional' dimension of hazards and not the 'daily-life' conditions of vulnerability. Prevention and mitigation measures are enclosed around hazards and consider disasters as phenomena out of the regular social fabric. Following this approach leads to dissociate risk and disaster from daily life and thus to overlook underlying, hazard-independent structural constraints. In the Philippines, despite very encouraging progress in recent years, the national and local governments still rely on a reactive disaster management system which emphasizes the extreme and rare dimension of natural hazards (Bankoff 2003; Delfin and Gaillard 2008). It relies on extra-ordinary measures to rescue and provide support to the victims. Yet, the availability of funding is dependent on a declaration of '*State of Calamity*'. In Borongan, it means that the shoreline where the town proper is located has to be affected. Fishermen who are missing off shore are not covered by this policy. Rescue is often undertaken by relatives and friends. The family of the dead may actually hope for a mere 22- to 45-US$ compensation should the boat is properly registered by the Bureau of Fisheries and Aquatic Resources, which is a rare case. The sole emergency aid may temporarily relieve victims from critical situations but it fails to strengthen their ability to avoid falling in those situations. The official disaster management policy thus limits its focus to treating the symptoms but disregards the root sources of harm which is deeply rooted in the un-sustainability of people's livelihoods.

Interviews with local officials and other institutional representatives show that most of them are aware of the weaknesses of the present disaster management framework. In response, a large array of stakeholders which include members of the local governments, non-governmental organizations, academia and civil society recently organized into a Disaster Risk Reduction Network. This network is presently pressing national authorities (i.e. Congress and Senate) to consider a new disaster management bill which would address most of the foregoing flaws.

Closing recommendations

It is today acknowledged that one of the most sustainable ways to reduce vulnerability and enhance capacity to face

natural hazards is through Community-Based Disaster Risk Reduction (CBDRR) programs coupled with development objectives (*e.g.* Anderson and Woodrow 1989; Maskrey 1989; Delica-Willison and Willison 2004). CBDRR emphasizes the participation of affected communities in both the evaluation of their needs and in the ways to sustain them. CBDRR empowers communities with self-developed and culturally acceptable ways of coping with crises brought by the occurrence of natural hazards. In the Philippines, a number of non-governmental organizations have achieved great success by adopting such a community-based bottom-up approach (*e.g.* Allen 2003, 2004; Anderson and Woodrow 1989; Delica 1999; Heijmans 2004; Heijmans and Victoria 2001; Luna 2001, 2003). Strengthening capacities at the community level does not exclude governments from action. Local authorities are often encouraged to foster participatory approaches to support and sustain community actions (Kafle and Murshed 2006). Such multi-stakeholders approaches are coined "co-management" and are widespread, with acknowledged success, in community-based coastal resource management in the Philippines and elsewhere in the world (*e.g.* Pomeroy and Pido 1995; Pomeroy and Berkes 1997; Pomeroy et al. 2001).

CBDRR further stresses the importance of sustainable livelihoods in enabling people to live with risks (Cannon et al. 2003; Twigg 2004; United Nations International Strategy for Disaster Reduction 2004). Living with risk means accepting that natural hazards are a usual part of life and productive livelihoods (Kelman and Mather 2008). In the case of Borongan fishermen, the ocean is at the same time resource and hazard for the locals. The CBDRR and sustainable livelihood approaches well fit together as both emphasize that people should be considered as dynamic actors rather helpless victims in the face of natural and economic hazards such as poverty. Focusing on livelihoods in disaster risk reduction and poverty alleviation enables to equally address development and vulnerability and locate both within the context of everyday life. The two approaches mutually benefit from each other as development contributes to reducing vulnerability and vulnerability reduction participates in the reinforcement of livelihoods.

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References

Alexander B, Chan-Halbrendt C, Salim W (2006) Sustainable livelihood considerations for disaster risk management: implications for implementation of the Government of Indonesia tsunami recovery plan. Disaster Prev Manage 15(1):31–50. doi:10.1108/09653560610654220

Allen K (2003) Vulnerability reduction and the community-based approach. In: Pelling M (ed) Natural disasters and development in a globalizing world. Routledge, London, pp 170–184

Allen K (2004) Building community resilience to disaster in the Philippines. In: International Federation of Red Cross and Red Crescent Societies (ed) World disaster report: focus on community resilience. International Federation of Red Cross and Red Crescent Societies, Geneva, pp 100–119

Anderson M, Woodrow P (1989) Rising from the ashes: development strategies in times of disasters. Westview, Boulder

Bankoff G (2003) Cultures of disaster: society and natural hazard in the Philippines. Routledge, London

Bankoff G (2004) In the eye of the storm: the social construction of the forces of nature and the climatic and seismic construction of God in the Philippines. J Southeast Asian Stud 35(1):91–111. doi:10.1017/S0022463404000050

Borongan Municipal Planning and Development Office (2005) Comprehensive land use plan of Borongan. Municipal Planning and Development Office, Borongan

Cannon T (1994) Vulnerability analysis and the explanation of 'natural' disasters. In: Varley A (ed) Disasters, development and environment. Wiley, Chichester, pp 13–30

Cannon T (2003) Vulnerability analysis, livelihoods and disasters components and variables of vulnerability: modelling and analysis for disaster risk management. Inter-American Development Bank/Instituto De Estudios Ambientales, Program on Indicators for Disaster Risk Management, Universidad Nacional de Colombia, Manizales

Cannon T, Twigg J, Rowell J (2003) Social vulnerability, sustainable livelihoods and disasters. Conflict and Humanitarian Assistance Department and Sustainable Livelihoods Support Office, Department for International Development, London

Center for Research on Epidemiology of Disasters (2008) EM-DAT: the OFDA/CRED international disaster database. Université Catholique de Louvain, Louvain. Available via http://www.cred.be/emdat Accessed 12 June 2006

Chambers R (1995) Poverty and livelihoods: whose reality counts? Environ Urban 7(1):173–204. doi:10.1177/095624789500700106

Chambers R, Conway GR (1991) Sustainable rural livelihoods: practical concepts for the 21st century. IDS discussion paper 296. Institute of Development Studies, Brighton

Coate B, Handmer J, Choong W (2006) Taking care of people and communities: rebuilding livelihoods through NGOs and the informal economy in Southern Thailand. Disaster Prev Manage 15(1):135–145. doi:10.1108/09653560610654293

Corporación OSSO La Red de Estudios Sociales en Prevención de Desastres en América Latina (2008) DesInventar online 8.1.9-2: sistema de inventario de efectos de desastres. Corporación OSSO/La Red de Estudios Sociales en Prevención de Desastres en América Latina, Cali. Available via http://online.desinventar.org/ Accessed 28 April 2009

Crittenden KS, Lamug CB, Nelson GL (2003) Socioeconomic influences on livelihood recovery of Filipino families experiencing recurrent lahars. Philipp Sociol Rev 51:115–134

Danguilan-Vitug M (1993) Power from the forest: the politics of logging. Philippine Center for Investigative Journalism, Quezon City

Davis I, Haghebeart B, Peppiatt D (2004) Social vulnerability and capacity analysis. Discussion paper and workshop report. ProVention Consortium, Geneva

Delfin FG Jr, Gaillard JC (2008) Extreme vs. quotidian: addressing temporal dichotomies in Philippine disaster management. Public Adm Dev 28(3):190–199. doi:10.1002/pad.493

Delica ZG (1999) Community mobilization for early warning. Philipp Plann J 30(2):30–40

Delica-Willison Z, Willison R (2004) Vulnerability reduction: a task for the vulnerable people themselves. In: Bankoff G, Frerks G, Hilhorst D (eds) Mapping vulnerability: disasters, development and people. Earthscan, London, pp 145–158

D'Ercole R (1998) Approches de la vulnérabilité et perspectives pour une meilleure logique de réduction des risques. Pangea 29–30:20–28

Department For International Development (1999) Sustainable livelihoods guidance sheets. Department For International Development, London

Devereux S (2001) Livelihood insecurity and social protection: a re-emerging issue in rural development. Dev Policy Rev 19(4):507–519. doi:10.1111/1467-7679.00148

Devereux S (2006) Vulnerable livelihoods in Somali Region, Ethiopia. IDS research report 57. Institute of Development Studies, Brighton

Eastern Samar Provincial Planning and Development Office (2004) Province of Eastern Samar socio-economic profile: where the Philippines meets the Pacific. Eastern Samar Provincial Planning and Development Office, Borongan

Gaillard JC (2007) De l'origine des catastrophes: phénomènes extrêmes ou âpreté du quotidien? Nat Sci Soc 15(1):44–47. doi:10.1051/nss:2007022

Gaillard JC (2008) Alternative paradigms of volcanic risk perception: the case of Mt Pinatubo in the Philippines. J Volcanol Geotherm Res 172(3–4):315–328. doi:10.1016/j.jvolgeores.2007.12.036

Gaillard JC, Liamzon CC, Villanueva JD (2007) 'Natural' disaster? A retrospect into the causes of the late-2004 typhoon disaster in Eastern Luzon, Philippines. Environ Hazards 7(4):257–270. doi:10.1016/j.envhaz.2006.11.002

Gaillard JC, Pangilinan MRM, Cadag JR, Le Masson V (2008) Living with increasing floods: insights from a rural Philippine community. Disaster Prev Manage 17(3):383–395. doi:10.1108/09653560810887301

Heijmans A (2004) From vulnerability to empowerment. In: Bankoff G, Frerks G, Hilhorst D (eds) Mapping vulnerability: disasters, development and people. Earthscan, London, pp 115–127

Heijmans A, Victoria LP (2001) Citizenry-based and development oriented disaster response: experiences and practices in disaster management of the citizens' disaster response network in the Philippines. Center for Disaster Preparedness, Quezon City

Hewitt K (1983) The idea of calamity in a technocratic age. In: Hewitt K (ed) Interpretation of calamities. The risks and hazards series No 1. Allen & Unwin Inc, Boston, pp 3–32

Huigen MGA, Jens IC (2006) Socio-economic impact of super typhoon Harurot in San Mariano, Isabela, the Philippines. World Dev 34(12):2116–2136. doi:10.1016/j.worlddev.2006.03.006

Kafle SK, Murshed Z (2006) Community-based disaster risk management for local authorities. Asian Disaster Preparedness Center, Bangkok

Kelman I, Mather T (2008) Living with volcanoes: the sustainable livelihoods approach for volcano-related opportunities. J Volcanol Geotherm Res 172(3–4):189–198. doi:10.1016/j.jvolgeores.2007.12.007

Korf B (2004) War, livelihoods and vulnerability in Sri Lanka. Dev Change 35(2):275–295. doi:10.1111/j.1467-7660.2004.00352.x

Labro V, Gabieta JA (2008) Landslides, floods isolate Eastern Samar. Philippine Daily Inquirer 19 February. Available via http://media.inquirer.net Accessed 25 September 2008

Lautze S, Raven-Roberts A (2006) Violence and complex humanitarian emergencies: implications for livelihoods models. Disasters 30(4):383–401

Longley C, Maxwell D (2003) Livelihoods, chronic conflict and humanitarian response: a synthesis of current practice. Overseas Development Institute working paper 182. Overseas Development Institute, London

Luna EM (2001) Disaster mitigation and preparedness: the case of NGOs in the Philippines. Disasters 25(3):216–226. doi:10.1111/1467-7717.00173

Luna EM (2003) Endogenous system of responses to river flooding as a disaster subculture: a case study of Bula, Camarines Sur. Philipp Sociol Rev 51:135–153

Mahmud N (2000) Flood disasters and population displacement: the case of Ormoc City, the Philippines. In: Parker DJ (ed) Floods–Vol. I. Routledge, London, pp 400–411

Mendoza AB, Alura DP (2001) Mangrove structure on the Eastern coast of Samar island, Philippines. In: Scott DE, Mohtar RH, Steinhardt GC (eds) Sustaining the global farm? Selected papers from the 10th International Soil Conservation Organization Meeting, May 24–29, 1999, West Lafayette. International Soil Conservation Organization / United States Department of Agriculture / Agricultural Research Service / National Soil Erosion Research Laboratory / Purdue University, West Lafayette, pp 423–425

National Statistics Office (2008) 2007 census of population and housing. National Statistics Office, Manila. Available via http://www.census.gov.ph Accessed 25 September 2008

Maskrey A (1989) Disaster mitigation: a community-based approach. Development guidelines No 3. Oxfam, Oxford

Oxfam (2005) How people are recovering their livelihoods 12 months after the tsunami. Oxfam briefing paper 84. Oxfam International, Washington

Philippine Atmospheric, Geophysical and Astronomical Service Administration (2005) Tropical cyclone statistics. Philippine Atmospheric, Geophysical and Astronomical Service Administration, Quezon City. Available via http://www.pagasa.dost.gov.ph. Accessed 25 September 2008

Pomeroy RS, Pido M (1995) Initiatives towards fisheries comanagement in the Philippines. Mar Policy 19(3):213–226. doi:10.1016/0308-597X(94)00008-G

Pomeroy RS, Berkes F (1997) Two to tango: the role of government in fisheries co-management. Mar Policy 21(5):465–480. doi:10.1016/S0308-597X(97)00017-1

Pomeroy RS, Katon BM, Harkes I (2001) Conditions affecting the success of fisheries co-management: lessons from Asia. Mar Policy 25:197–208. doi:10.1016/S0308-597X(01)00010-0

Pomeroy RS, Ratner BD, Hall SJ, Pimoljinda J, Vivekanandan V (2006) Coping with disaster: rehabilitating coastal livelihoods and communities. Mar Policy 30:786–793. doi:10.1016/j.marpol.2006.02.003

Régnier P, Neri B, Scuteri S, Miniati S (2008) From emergency relief to livelihood recovery: lessons learned from post-tsunami experiences in Indonesia and India. Disaster Prev Manage 17(3):410–429. doi:10.1108/09653560810887329

Sanderson D (2000) Cities, disasters and livelihoods. Environ Urban 12(2):93–102. doi:10.1177/095624780001200208

Start D, Johnson C (2004) Livelihood Options? The political economy of access, opportunity and diversification. Overseas Development Institute working paper 233. Overseas Development Institute, London

Scoones I (1998) Sustainable rural livelihoods: a framework for analysis. IDS working paper 72. Institute of Development Studies, Brighton

Scoones I (2009) Livelihoods perspectives and rural development. J Peasant Stud 36(1): 171–196. doi:10.1080/03066150902820503.

Sen A (1981a) Poverty and famines: an essay on entitlement and deprivation. Oxford University Press, Oxford

Sen A (1981b) Ingredients of famine analysis: availability and entitlement. Q J Econ 96(3):433–464. doi:10.2307/1882681

Termelo RN (1997) Managing a disaster: a case of Taal volcano island. Bureau of Emergency Assistance, Department of Social Welfare and Development, Quezon City

The World Bank, National Disaster Coordinating Council (2004) Natural disaster risk management in the Philippines: enhancing poverty alleviation through disaster prevention. The World Bank / National Disaster Coordinating Council, Manila

Twigg J (2001) Sustainable livelihoods and vulnerability to disasters. Working Paper No 2. Benfield Hazard Research Centre, London

Twigg J (2004) Disaster risk reduction: mitigation and preparedness in development and emergency programming. Good practice review No 9. Humanitarian Practice Network, London

United Nations Development Programme (2004) Reducing disaster risk: a challenge for development. United Nations Development Programme, Geneva

United Nations International Strategy for Disaster Reduction (2004) Living with risk: a global review of disaster reduction initiatives. United Nations International Strategy for Disaster Reduction, Geneva

Watts MJ, Bohle HG (1993) The space of vulnerability: the causal structure of hunger and famine. Prog Hum Geogr 17(1):43–67. doi:10.1177/030913259301700103

Wisner B (1993) Disaster vulnerability: scale, power, and daily life. Geo-Journal 30(2):127–140. doi:10.1007/BF00808129

Wisner B, Blaikie P, Cannon T, Davis I (2004) At risk: natural hazards, people's vulnerability, and disasters, 2nd edn. Routledge, London