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Vulnerability and Recovery from the Tsunami: Building Resilient Coastal Communities

Rasmus Klocker Larsen, Fiona Miller, and Frank Thomalla

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A Synthesis of Factors Contributing to Tsunami-related Vulnerability in Sri Lanka and Indonesia

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SUMMARY

In this study we conducted a meta-analysis to synthesise insights from 382 documents from the tsunami recovery literature on the key factors contributing to vulnerability to the 2004 Indian Ocean Tsunami and to emerging vulnerabilities related to post-disaster recovery in Sri Lanka and Indonesia. Acknowledging the diversity of vulnerability concepts, vulnerability was interpreted in a simple form as referring to a person or social group's (a vulnerability unit) experience of a kind of stress (risk/outcome) if they are exposed to a certain type of stress, or hazard (causal factor).

Vulnerability is a concept that is often used yet rarely systematically explained or rigorously investigated in practice and just 40 documents were found to contain actual substantiated vulnerability insights with a focus on vulnerable groups. A total of 137 substantiated vulnerability insights were identified and the most vulnerable groups identified were displaced people, women, children, families, farmers and victims from other emergencies. 75 % of all risks identified were emerging during the recovery process, and half of these relate to aid delivery.

In an investigation of the underlying causes of newly emerging vulnerabilities we present how a situation is manifest where, in summary, 1) a lack of long-term planning and undifferentiated aid neglects the diversity of the displaced people and leads to their deepening dependency; 2) aid delivery in coastal communities adds to pre-existing resource conflicts and community tensions, with benefit distribution and coastal zone policies in particular being highly contested; and 3) the underlying causes of women's abuse are not addressed despite a high awareness of the issues, leading to the perpetuation of a culture of gender inequality and marginalisation.

Using a social learning approach, we conclude by arguing that the underlying causes of newly emerging vulnerabilities persist due to a lack of mechanisms for collective action in the wider recovery community and their limited capacity to learn to build resilience. Whilst post disaster aid delivery is an important aspect of disaster risk reduction it could also play a crucial role in supporting the longer term sustainable recovery and development of coastal communities. However, due to its competitive, rather than cooperative, nature it currently often contributes to rather than reduces vulnerability against future shocks.

1 INTRODUCTION: VULNERABILITY THINKING IN RECOVERY PRACTICE

1.1 Newly emerging vulnerabilities in post-tsunami recovery

Vulnerability and capacity assessments carried out in Sri Lanka in collaboration with the International Federation of the Red Cross and Red Crescent Societies (IFRCRC) and the Sri Lankan Red Cross Society (SLRC) have raised concerns that new vulnerabilities appear to be emerging during the 2004 Indian Ocean Tsunami recovery, most notably amongst marginalised social groups (Miller *et al*., 2006). Whilst it is appreciated that in the aftermath of the tsunami a multitude of organisations and individuals have contributed to the debate on relief and recovery, generating an impressive body of literature, it has been found in this study that only a small part of this literature is directly based on primary information, empirical or field-based studies to inform substantiated vulnerability arguments. There is thus limited published information available to date on what really makes people vulnerable to the tsunami and post-disaster recovery phase. Likewise, the question arises how vulnerability is understood and interpreted by humanitarian and civil society organizations that apply the concept in their operational activities. This has implications for their capacity to reduce the livelihood impacts of disasters, and to identify more appropriate and sustainable forms of recovery.

Numerous desk-based studies on the tsunami exist, the most comprehensive being the review from the Tsunami Evaluation Coalition conducted last year with the facilitation by ALNAP at the Overseas Development Institute (Telgrave *et al*., 2006). CARMA International (2006) evaluated the tsunami communications in the media, and numerous reviews focused on specific technical, sectoral, or policy concerns, such as drinking water (Clasen and Smith, 2005), fisheries (NACA *et al*., 2005) and human rights (Action Aid, 2005). However, to our knowledge, no systematic review of the tsunami literature has been undertaken to-date using a vulnerability perspective. Prior synthesis studies focused almost exclusively either on the immediate impacts of the disaster or operational aspects of the recovery.

In this study, we undertake a meta-analysis of the available literature to identify key factors contributing to vulnerabilities to the tsunami and to emerging vulnerabilities during the post-disaster recovery process. Focusing on the application of vulnerability thinking in the literature, we document the underlying causes and contributing factors identified in the selected literature through the application of a simple conceptual framework of vulnerability. The review includes Indonesia and Sri Lanka, as these countries were most severely affected by the tsunami. The study aims to contribute to the development of vulnerability analysis, particularly the operationalisation of vulnerability in practice.

The study is part of a larger effort of the Stockholm Environment Institute's (SEI) Risk, Livelihoods & Vulnerability Programme to synthesise learning on human (social) vulnerability to the tsunami and other coastal hazards (see also Zou and Thomalla, forthcoming) in order to improve the capacity to conduct vulnerability assessments and mapping, and to contribute to more sustainable post-disaster recovery efforts. It seeks to inform the ongoing work of SEI and its partners aimed at assisting planners and decision makers in local and provincial governments and non-governmental organisations in planning interventions after the tsunami to reduce vulnerability and enhance resilience in coastal communities in South and Southeast Asia.

Accordingly, the aim of this study was:

To identify the key factors, as documented in the literature via substantiated primary data, which have contributed to vulnerability associated with the 2004 Indian Ocean Tsunami in Sri Lanka and Indonesia.

2 META-ANALYSIS METHODOLOGY

2.1 Theoretical basis: allowing for the widest inclusion of vulnerability insights

Vulnerability is a concept that is often used yet rarely systematically explained or rigorously investigated in practice. A diverse range of vulnerability concepts exist in the scientific literature, reflecting the contributions of a number of disciplines (Adger, N. 2006; Alwang *et al*., 2000; Cutter 2003; Turner II, 2001; Turner II *et al*, 2003; Wisner *et al* 2004; Cannon *et al*., 2003; Kasperson, *et al*. 2002), each approach giving emphasis to different dimensions of vulnerability. Whilst this body of work has increasingly presented insights into the complex nature of the social-ecological systems in which vulnerable groups are situated, the large number of definitions and concepts lead to confusion and low uptake in operational activities.

A number of recent SEI studies attempt to understand how multiple complex and interacting factors contribute to human vulnerability in different contexts. For example, Lindskog *et al*. (2005) investigate the vulnerability of livelihoods in Dak Lak Province, Vietnam, to changes in land use management practices, world coffee market prices, in-migration and climate variability. Ziervogel *et al*. (2006) consider how rural communities in Sekhukhune, South Africa, cope with and respond to health, water and climate stresses. Calgaro (2005) documents the vulnerability of the tourism dependent community of Khao Lak in Thailand to the 2004 Asian Tsunami. All of these studies applied the conceptual vulnerability assessment framework developed by Kasperson and Kasperson (2001) and Turner *et al* (2002).

The Turner framework distinguishes three dimensions of vulnerability: *exposure* to stresses, perturbations, and shocks; the *sensitivity* of people, places and ecosystems to the stress or perturbation, including their (capacity to anticipate and cope with the stress); and the *resilience* of the exposed people, places and ecosystems; that is their ability to recover from the stress and to buffer themselves against and adapt to future stresses and perturbations (Turner *et al*, 2003). Adger (2006) presents a formulation of vulnerability as a characteristic of the resilience of social-ecological systems, and he argues there is a challenge to develop robust and credible measures of vulnerability.

Despite the distinction made in the Turner framework, vulnerability is often seen as the opposite of resilience, with vulnerability decreasing through the increase of resilience. In the review of resilience to coastal disasters by Adger *et al*. (2005) resilience is seen as the capacity of social-ecological systems to absorb a disturbance, such as a tsunami, yet retain their essential features. Further, they state that ‘resilience reflects the degree to which a complex adaptive system is capable of self-organization (versus lack of organization or organization forced by external factors) and the degree to which the system can build capacity for learning and adaptation’ (p. 1036). Downing (2000) suggests that vulnerability is often perceived

as the opposite of coping capacity. Miller *et al* (2005, p. 3) add that 'in this context it is a measure of the extent to which people, societies and ecosystems risk damage from environmental or socio-economic stress or disturbances'. A factor can therefore contribute to the vulnerability of a system by lowering the resilience of this system.

It is beyond the scope of this study to go into detailed scientific discussion of the conceptual relationship between these different concepts of vulnerability, and the relationship between vulnerability and resilience (see rather Galoppin, 2006; Adger, 2006; Folke, 2006). Instead, we focus our methodology on the very basis of the vulnerability perspective; that it helps explain the underlying causal structures of a negative outcome by focusing one's attention on vulnerable groups. Such a perspective is therefore distinguished from many other approaches to hazards and environmental change, in that it links a social group with a causal factor and a consequent risk/outcome, and gives attention to changes over time, such as preparedness, coping, recovery and adaptation.

The meta-analysis methodology applied here draws upon earlier applications of such methods in sustainability science, such as Misselhorn (2005), Geist and Lambin (2002) and Zou and Thomalla (forthcoming). Here, it is understood that multiple causes, which can be both proximate and underlying, affect the vulnerability of a social group. These causal patterns are expressions of social and ecological dynamics, which are systemic in character. The meta-analysis approach is thus situated within a vulnerability perspective on social-ecological systems, where it is understood that all dimensions of social, institutional, ecological, and physical processes can potentially be of importance in contributing to people's vulnerability.

In the final reflection on the underlying causes of newly emerging vulnerabilities we draw specifically on a theory of social learning. In the approach taken by Etienne Wenger (1998), it is considered that learning by agents of the recovery depends on four composite pillars: 1) belonging to a community of practice; 2) learning by doing; 3) meaning and sense-making which builds on experience; and 4) becoming and identity development. Thus, people live, exist and learn as social beings in interaction with others. This interaction takes place in a community of practice, where the involved actors take part in a systemic process of negotiating meaning. In contributing to collective action in the recovery process, social learning is 'the process of co-creation of knowledge, which provides insight into the causes of, and the means required to transform, a situation'. (SLIM, 2004, p. 1).

2.2 Review process: identifying and synthesising vulnerability lessons

Search and retrieval of documents

The documents included in the review were retrieved from a comprehensive search using a number of search engines, capturing documents produced within two years of the tsunami (see appendix 1). The search was made with two aims:

1. To obtain a well-informed picture of the literature and thus the recovery debate;

2. To obtain a comprehensive sample of substantiated arguments based on primary data.

The literature was found to be extensive, and during the first phase of retrieval, the search was refined to cover more credible documents, i.e., only those documents based on studies that had generated primary data and claims that were well substantiated. While the focus was on documents which provided detailed information on vulnerability related issues, representatives of types of documents that were assumed 'peripheral' were also included, such as news items, travel writing, and web-based articles. Therefore, the search was quite broad, based on coarse scale keywords. In cases where agencies and researchers provide continuous updates, documents were sampled at random to represent a certain type of literature. This was the case for what in the subsequent characterisation of the literature has been described as 'information pieces' and 'response updates'. However, these documents were not considered in the subsequent analysis because they included no primary data or specific vulnerability insights.

Primary data and substantiated vulnerability insights

We consider in this study only the social vulnerability and coping capacity of identified vulnerable groups, focusing on substantiated claims made using primary data. In the context of vulnerability and resilience after the tsunami primary data is here considered to be information derived from an agency or researchers' direct interaction with a social group or their environment. 'Data' is interpreted in a broad sense, including both quantitative and qualitative information, regarding all dimensions of a vulnerable group's livelihood situation. That is, primary data is the result of empirical analysis from actual field work and does not comprise dialogue sessions or an agency's description of own response. Moreover, we understood 'substantial' as also including the application of an explicit methodology. The exclusion of documents from the review was therefore dependent on either an absence of first hand data, sufficient description of process to prove that primary data is presented, or a lack of information on social vulnerability. Each document was analysed using a spreadsheet to organise the data according to a number of criteria, which beyond the identification of the specific vulnerability included: document type; data type and source; data generation approach; focus and scope; aim of contribution; time of data generation and publication; country; geo-location in country; and suggestions on building resilience).

Coding, identification and categorisation of vulnerability insights

For the purpose of this study vulnerability is seen as emerging from an individual's or group's position in a wider human-environment system, including by definition a wide range of socio-economic and environmental aspects. Resilience is interpreted in terms of the system's buffering capacity and ability to re-organise and recover. Acknowledging the diversity of conceptualisations of vulnerability and resilience, as discussed in section 2.1, the study attempted to allow for the widest possible inclusion of vulnerability insights by

Table 1: Glossary for concepts employed in the analytical framework

Term	Definition
Vulnerability	The combined existence of a vulnerable group, a risk and a causal factor.
Vulnerable group/unit	A defined social group which is seen as experiencing an increased risk because of the influence of a causal factor.
Causal factor	A factor which leads to a detrimental outcome for the vulnerability unit, or an increased risk of this happening.
Risk	A change which is perceived (by an agency or researcher) as harmful to a vulnerable group.
Resilience	Capacity of a social group or social-ecological system to cope with the influence of a causal factor and avoid the harmful outcomes of a risk

using a simplified framework of vulnerability. This was feasible considering the purpose of reviewing a large number of papers, reports, maps and data-sets, and for appreciating the expected conceptual diversity of vulnerability amongst applications. Vulnerability insights were the key focus of the review, while resilience and coping capacity were also considered in order to investigate the actions taken and recommendations made to reduce vulnerability and build resilience.

Vulnerability was thus interpreted as referring to a person or social group's (a vulnerability unit) experience of a kind of stress (risk/outcome) if they are exposed to a certain type of stress, or hazard (causal factor). This means that vulnerability is associated with: a vulnerable subject; a causal factor; and an increased risk or actualisation of a negative outcome (table 1).

In a detailed reading of each document each reference to specific social groups, e.g. displaced people, was documented. When a group was identified, the text was deconstructed for logical links to a cause and a risk/outcome. An example is the statement that the group was vulnerable to 'erosion of livelihood opportunities' due to 'hasty efforts' to relocate people in the recovery (Shanmugaratnam, 2005). This argument, consisting of the three linked notions, is seen as a 'vulnerability insight' (see Figure 1).

Each document containing primary data and a focus on social groups was analysed to identify arguments that link a social (vulnerable) group to a cause and a resulting risk/outcome. This is defined as a vulnerability insight.A vulnerability insight thus represents a claim of causality made by an author in a particular document. The example shown is from Shanmugaratnam (2005).

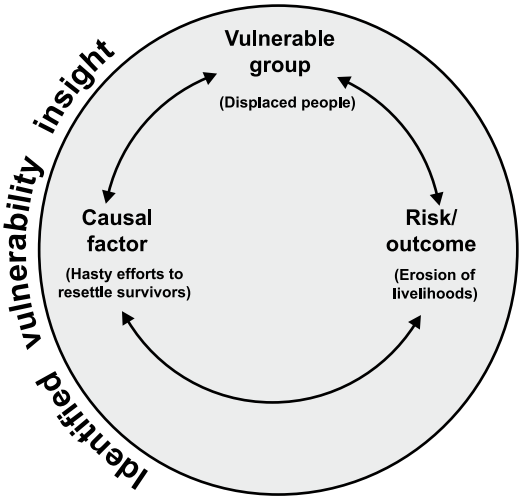

Figure 1: Schematised visualisation of how the vulnerability insights were identified

The vulnerability insights were subsequently aggregated according to type of group, risk (outcome) and causal factor. For social groups, insights were grouped into basic social categories to allow for selection of the most commonly identified factors. No effort was made to sub-divide the identified vulnerable groups, even though some groups, such as the internally displaced people (IDPs), represented an enormously heterogeneous group, consisting of those displaced by the tsunami, as well as those displaced for other reasons, such as conflict. Risks and causal factors were classified according to social, institutional, ecological and economic factors (see Appendix 2). Amongst the identified factors, a significant number of observations were made regarding the livelihood effects of emerging vulnerabilities and it was decided not to disaggregate these further. The review process occurred in an iterative manner, returning several times to each document as the process was refined.

The chronology of vulnerability

We distinguish between vulnerabilities triggered by the tsunami and those which emerge during the recovery. Most agencies in the recovery distinguish between different disaster phases in their response, and in the Tsunami Evaluation Coalition's synthesis study a distinction is made between three notional phases: immediate emergency, early recovery phase, and transition from recovery to development (Scheper *et al*., 2006). This acknowledges an overlap between theses phases through recognition of a succession from relief to recovery to development (Table 2), and whilst there are other finer distinctions made, these three broad distinctions are applied here.

Table 2: Phases of vulnerability during and after the Tsunami 25 December 2004

Vulnerability category	Created by...
Disaster vulnerability	Factors contributing to vulnerability associated with the tsunami (relief)
Immediate vulnerability	Factors contributing to vulnerability associated with emergency phase (recovery)
Emerging vulnerability	Factors contributing to vulnerability associated with recovery (development)

Adapted from Scheper et al., 2006.

3 A PERSPECTIVE ON KNOWLEDGE GENERATION IN THE TSUNAMI RECOVERY LITERATURE

The tsunami literature is generally characterised by being enormous, but containing limited primary data and few arguments substantiated via data and explicit methodology, thus generating few vulnerability insights. This section outlines these basic characteristics.

3.1 Lack of primary data

A total of 382 documents were retrieved from the literature search, and some 11 types of document were distinguished according to the nature of their content (Figure 2 and Appendix 3). Figure 2 shows the prevalence of different types of documents. Of the 382 documents reviewed for information on social vulnerability and primary data, 101 documents were selected for more detailed analysis. The Tsunami Evaluation Coalition (TEC) drew on a total of 8000 documents retrieved via Relief Web and the Humanitarian Information Centre (HIC) of the Office for the Coordination of Humanitarian Affairs (OCHA) (De Ville de Goyet and Moriniére, 2006), but the number of documents containing primary data, all of which according to ODI staff are made available at the TEC homepage (Pers. Com, 2006), was very minor. In our review, of the 51 selected documents published in peer-reviewed journals, 11 included primary data on social groups. The six two-year updates retrieved did not present any new primary data, but rather provided summaries that featured little substantial data and focused on renewed reflection and theoretical discussion (e.g. Care International, 2006, TRO, 2006; IFRCRC, 2006). The same was the case for the seven newsletters and magazines included, which are representative of much larger bodies of texts.

There was dominance of relevant information from Sri Lanka (Figure 3). This may be partly due to the better availability of primary data via web-portals and field visits to the country. Many organisations do not publish online and some grey literature lacks basic features (such as date, author, and organisation) which prevented their use. There is excellent web-portal access to reports from Sri Lanka (see Appendix 1), and the Sri Lankan Government's Department of Census and Statistics presents data sets on a number of topics (Department of Census and Statistics, 2005).

3.2 Limited substantiation of arguments: forgetting the vulnerable groups?

Of the 101 documents selected for in-depth analysis, just 40 documents were found to contain substantiated vulnerability insights, with a focus on the vulnerable groups, as captured by the analytical framework applied in this study (these documents are listed in Appendix 4). Vulnerable groups thus rarely receive explicit focus. Recovery

Table 3: A non-exhaustive list of prevalent sense making perspectives in the literature

	Sense making perspective – looking for:	Examples from the literature
1	**Needs**	HRCSL et al., 2005; LTTE, 2005
2	**Damage and impacts**	CGI, 2005; AusAid and Care International, 2005
3	**Lessons and planning priorities**	Care et al., 2005; Fritz Institute, 2005
4	**Top priorities and recovery 'issues'**	GoI, 2005; OCHA and UNEP, 2005
5	**Human Rights violations**	Action Aid, 2005; HRC and EWC, 2005
6	**Psychosocial impacts**	Mattock, 2005
7	**Vulnerability and risks**	Birkmann et al., 2006; Miller et al., 2006

Note: Whilst other perspective than the explicit vulnerability analysis (7) can contain certain vulnerability insight (e.g. 5 and 6) they often lack specification of who is vulnerable and why (e.g. 1 and 2) or are tailored to audience or purposes which do not enable attention to vulnerability (e.g. 3 and 4).

efforts are motivated by a range of aims, many of which in themselves consider other purposes than improving the resilience of vulnerable groups. Often the 'speed of recovery' is an overriding priority, which contributes to reliance on quick and/or already institutionalised approaches, applying a sense-making perspective, i.e. looking for indications, of 'damage', 'needs', and 'priority issues'. A vulnerability perspective is rarely applied (see table 3).

Common explanations and findings are generalised and assumed to be relevant to the context of specific vulnerable groups, yet specific links to these contexts are not made. For instance the ADB claims (2005a, p. 1), that 'despite the unprecedented scale of loss of human life, homelessness, and displaced populations, the macroeconomic impact of the disaster will be limited and marginal'. Such a claim disconnects the macro-economic context from the livelihoods of people who comprise that very economy, and may contribute to the creation of a mismatch between the data generated and recommendations made, and the realities of vulnerable groups. In another example, the issue is not so much the focus on diverse or complex issues, such as trees and timber demand (Greenomics Indonesia and WWF, 2005) rather than a focus on people, but rather how such concerns for environmental sustainability can be (or not) related to differentiated social vulnerability. There are some reports that appear to be based on substantial work (George, 2005; Samuel and Richards, 2005; World Tourism Organisation, 2005; WHO, 2005a) but no detailed discussion of method is provided, and this makes it difficult to apply, or trust, the data and arguments presented. There

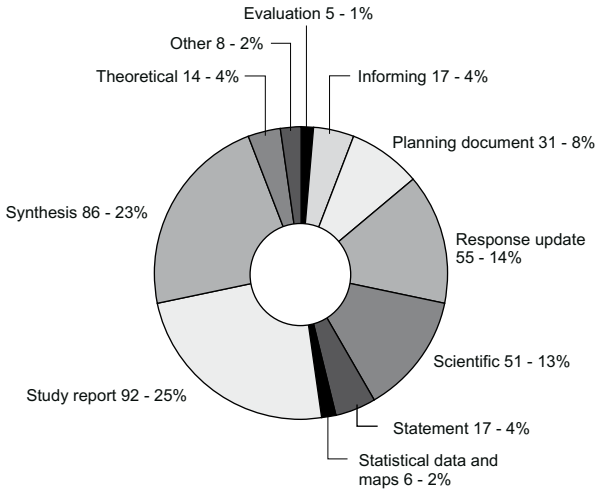

Figure 2: The prevalence of the different types of documents in the literature, distinguished by content and purpose. The figure indicates the number of documents in each category and the respective percentage of the total literature reviewed

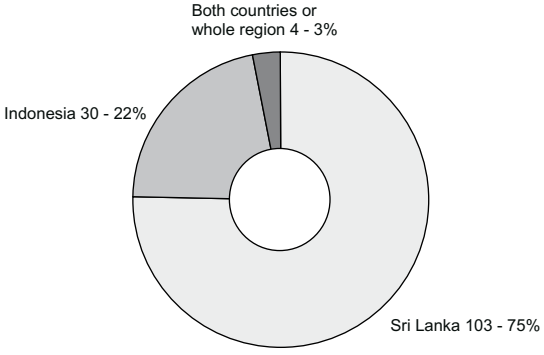

Figure 3: Distribution of vulnerability insights per country. Number of vulnerability insights and their percentage of total

is limited attention given to the knowledge generation process, and many 'fact finding' and 'verification' missions include next to no description of the underlying process of data generation (e.g. BDG, 2005). The credibility of the recommendations presented in these reports therefore rely entirely on the credibility of their authors and publishers. This finding supports the conclusion of the Tsunami Evaluation Coalition that the limited documentation of methodologies severely limits the validity of needs assessment (de Ville de Goyet and Morinière, 2006). Other organisations, including the Environmental Foundation Ltd. of Sri Lanka (2005a), have voiced similar critiques.

4 VULNERABILITY LESSONS DRAWN FROM THE SYNTHESIS

4.1 Emerging social vulnerability

A total of 137 substantiated vulnerability insights were identified, and Figure 4 shows the complete distribution of these vulnerabilities as represented in the literature. What is highlighted as 'risks' represents what is also referred to as for example 'issues' or 'needs' in the literature under other analytical frameworks than vulnerability (see Table 3 and examples in Appendix 2). This section provides an overview of the general conclusions from these results as we attend to each point in turn below. It can be seen that social and institutional factors and risks dominate among the identified vulnerabilities, and that most of them emerge during the recovery, proximately driven by the external intervention.

The complexity and multiple interacting causes contributing to vulnerability are presented with each peak symbolising an aggregate of identified cause-effect relationships. The five main risks relate to psychological damage, health, livelihood, abuse issues, and conflict and marginalisation. A total of 20 different causes are identified, most of which are social and institutional in character. External intervention is the most dominating driving factor.

The most vulnerable: displaced people, women and children

From the literature reviewed, 11 distinct (but not exclusive) vulnerable groups were identified. The category 'other' represents references to more general groupings which could not be defined more clearly, e.g. 'beneficiaries', 'survivors'. Figure 5 shows that the groups receiving the greatest focus in the literature are defined predominantly according to social characteristics (women, children, families), livelihoods (farmers, fishermen, coastal communities), and victimisation (displaced people, patients, victims from other disasters). The most vulnerable groups, as determined from the number of specific vulnerability insights, are displaced people (51), women (15), children (12), families (9), farmers (8) and victims of other emergencies (8).

Traditional livelihoods dominate in the literature

It is clear that 'traditional' livelihoods, such as farming and fishing, receive more attention than new or innovative livelihood strategies such as tourism, other entrepreneurs or those engaged in service sectors. Only three documents draw attention to vulnerabilities for entrepreneurs (small scale businesses and traders) highlighting how their livelihoods have been eroded as consequence of the financial problems arising after the tsunami, and the obstructed flow of goods from the coast and inland (CGI, 2005; ICASERD and Ministry of Agriculture, 2005; GoI, undated). People working in tourism are not mentioned as a vulnerable group. As the only source, Birkmann *et al* (2006) identify smaller occupational segments of vulnerability, groups such as 'daily paid labour as mobile fish sellers' (p. 35).

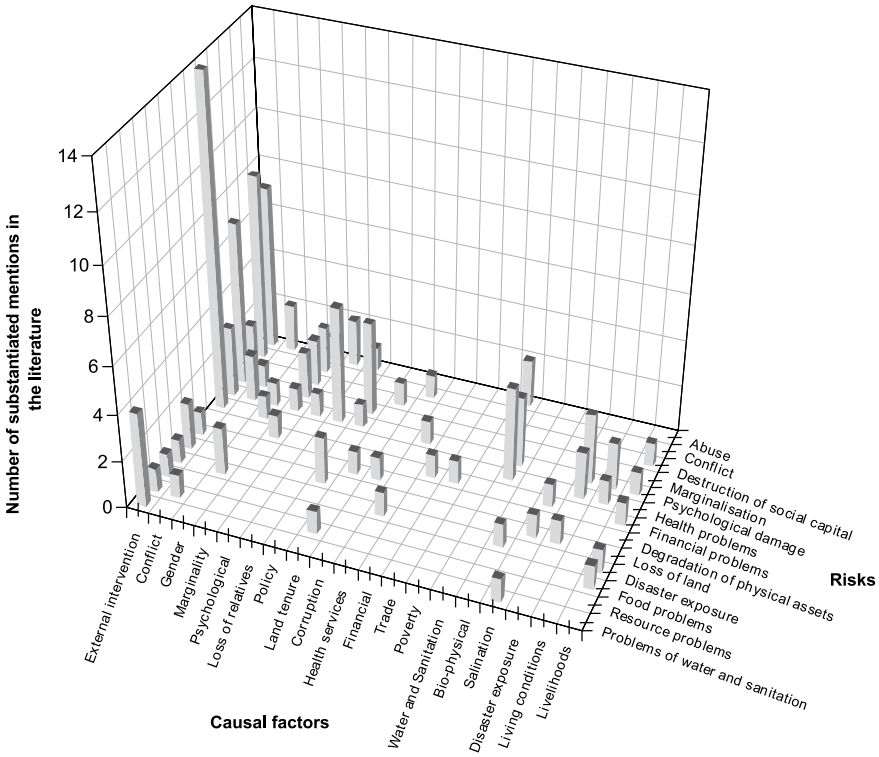

Figure 4: Synthesis of the vulnerabilities in Sri Lanka and Indonesia after the 2004 tsunami

The vulnerabilities are predominantly human, social and institutional in character

Not surprisingly a wealth of risks and vulnerability factors has been identified as influencing the ease and sustainability of recovery. Some 15 types of risks were identified and 20 different causes (Appendix 2). It is clear that the causes of vulnerability derive from all sectors of society and spheres of people's life in Sri Lanka and Indonesia, hence representing a complex interwoven connection between causes and outcomes in creating vulnerability. As it appears in Figures 6, 7 and 8, the risks and causes of vulnerability are predominantly human, social and institutional in character, but a significant number of ecological-physical factors are also apparent. While it is not a new observation that socio-economic factors create vulnerability (e.g., Miller *et al*., 2005), it is significant that risks related to social aspects compose more than 50 % of all causes of vulnerability. This review therefore supports earlier findings that hazard vulnerability is largely socially constructed, meaning that it is predominantly social factors that lead to vulnerability. However, as most assessments to date have focused on sectoral aspects, leaving broader livelihoods issues aside (de Ville de Goyet and Morinière, 2006), there exist relatively few documents that focus on emerging

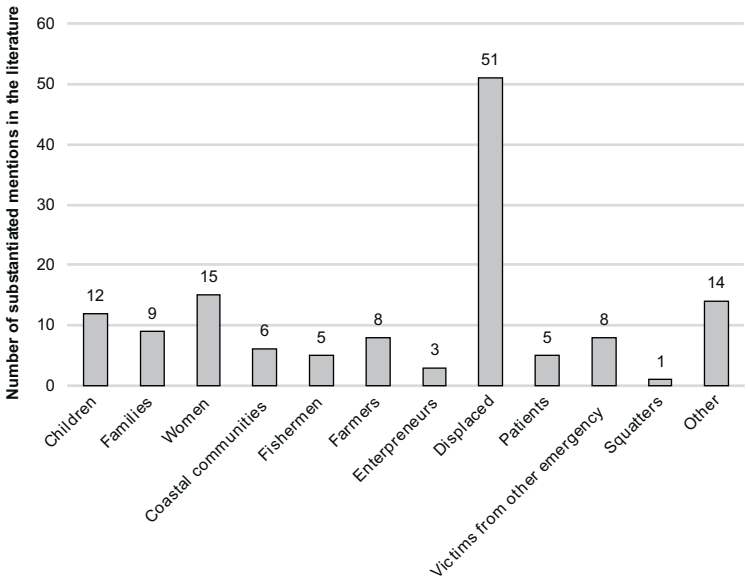

Figure 5: Vulnerable groups as identified in the literature
Note: Displaced people, women, children, farmers and victims from other emergencies are identified as the most vulnerable, irrespective of cause and risk

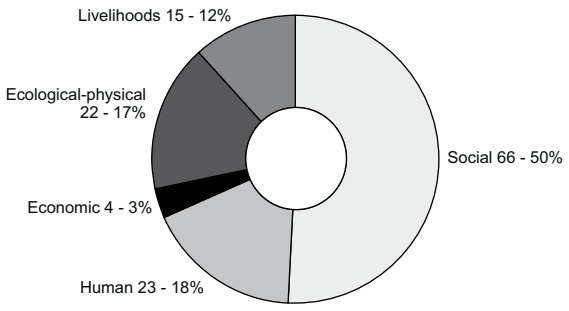

Figure 6: Risks described in the literature aggregated to categories

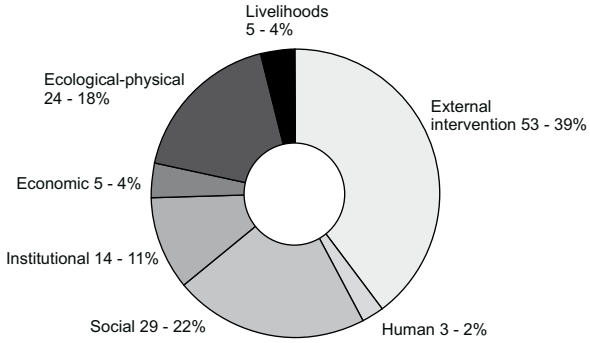

Figure 7: Causes described in the literature aggregated to categories

vulnerabilities and the social/institutional dimensions of vulnerability. It is therefore expected that a great deal of vital understanding of the vulnerability context remains to be addressed. Whilst only one of 11 vulnerability insights identified in the selected literature relate to bio-physical factors contributing to tsunami vulnerability, bio-physical aspects play a disproportionately prominent role in the scientific and synthesis documents (e.g. Adger *et al*., 2005).

Emerging vulnerabilities during recovery

When analysing the basic chronology of vulnerability, it is clear that most of the vulnerabilities documented emerge during the recovery process (Figure 9). As Figures 4, 7, and 8 show, by far the most significant causal factor contributing to newly emerging vulnerabilities in the recovery phase identified in the literature, is aid delivery, or external intervention. Some 75% of all vulnerabilities identified emerge during the recovery, and half of these relate to aid delivery (mentioned 51 out of 103 times in the literature). This is significant, especially as other causes are described only as scattered information, with pre-existing and emerging 'marginalities' for certain groups being the second highest ranked, with just 7%. The recovery process is perceived as producing a significant psychological and socially related vulnerability, especially amongst people who are most affected by the recovery, i.e. displaced persons. Figure 4 illustrates that the vulnerabilities described in the literature depend on a large number of causes and risks, embedded in the livelihood situation of people, and rooted in the political and historical trajectories of the social groups and the respective country. Hence, a situation is manifest where aid delivery in a complex environment leads to the emergence of new sources of vulnerability.

The underlying causes of newly emerging vulnerabilities

Distinguishing between aid delivery, other external interventions and policy related factors affecting recovery is not easy. Also, the fact that aid was identified in many documents as the main cause of emerging vulnerabilities may also reflect a bias in the attention of the aid organisations towards their own operations. We concluded in Section 3 that there are few substantiated vulnerability insights, that there is a high

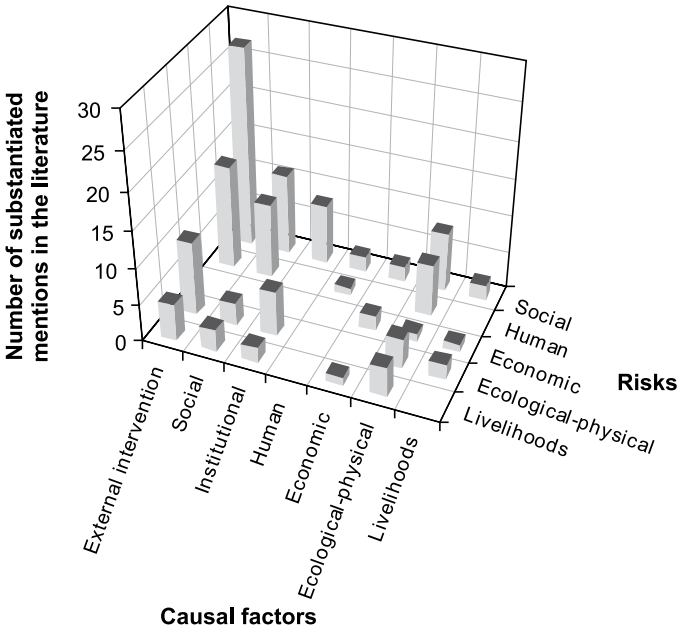

Figure 8: Aggregated synthesis of all vulnerabilities identified

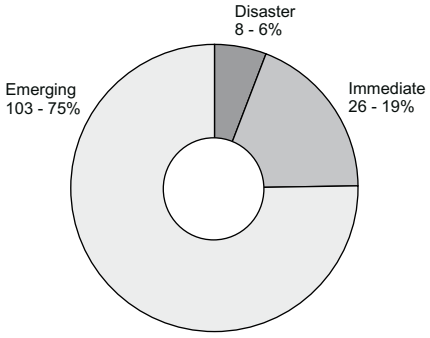

Figure 9: Temporal distribution of the vulnerabilities identified in the literature
Note: Emerging vulnerabilities dominate. The phases relating to the disaster cycle are explained in Table 1, Section 2.2.)

diversity of conceptual frameworks for analysing vulnerability, and that there exists limited and highly diverse data. In appreciation of this situation we undertake a more detailed investigation of the underlying causes of the newly emerging vulnerabilities caused by aid delivery based on a qualitative analysis.

To focus this investigation we chose to consider specifically the three social groups identified in the selected literature as the most adversely affected by external intervention, as measured by the number of times mentioned. These were displaced people, women, and fishermen (Figure 10). This selection also represented one group from each category mentioned above (Section 4.1), defined by criteria of social belonging, victimisation, or livelihoods. Because 'fishermen' and 'coastal communities' represent quite distinct categories in terms of livelihood specialisation, but were often mentioned together in arguments relating to the recovery process, we included the insights on 'coastal communities' in a joint group with fishermen, in order to expose some potential tensions in the literature. The groups labelled 'other' and 'patients' were not included in the analysis as they were considered too unspecified. The three groups selected were thus 'displaced people' (Section 5.1), 'coastal communities' (Section 5.2), and 'women' (Section 5.3). The corresponding most important emerging vulnerabilities were health problems, conflict, and abuse, respectively (Figure 11).

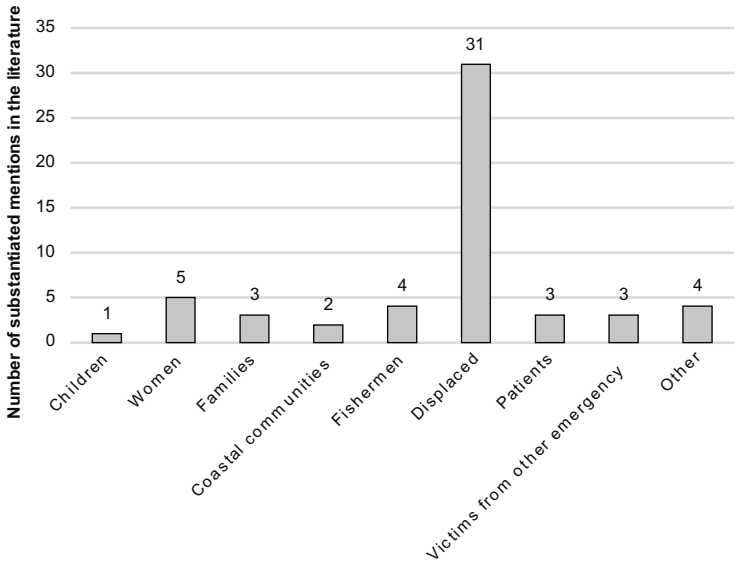

Figure 10: Vulnerable groups exposed to new risks during the post-tsunami recovery

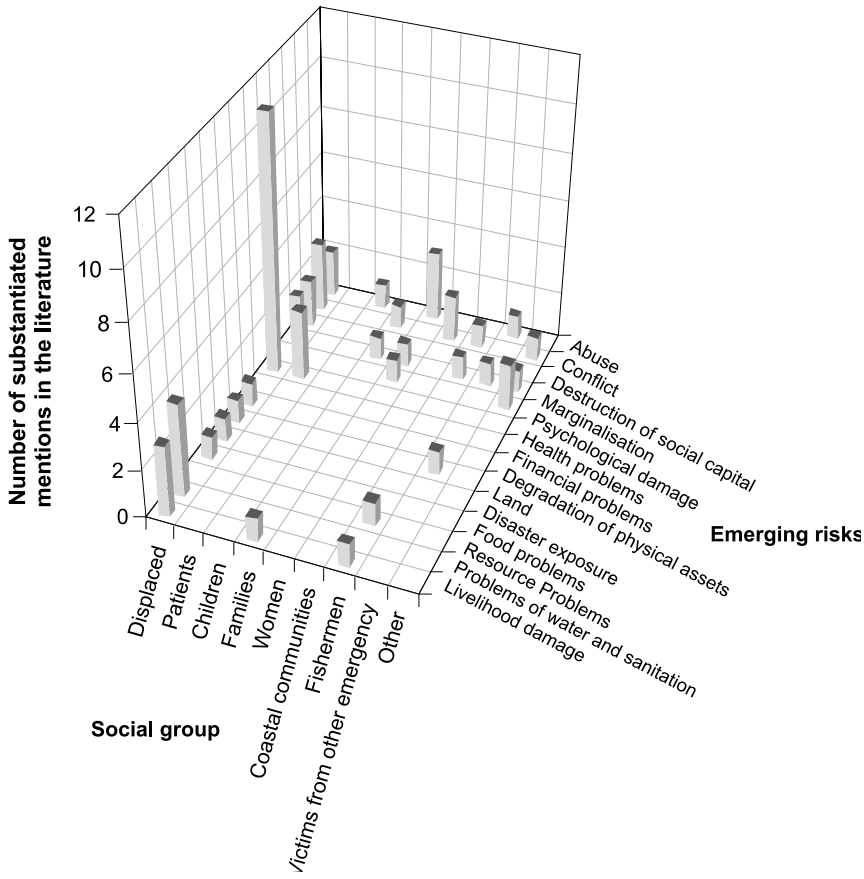

Figure 11: Newly emerging risks for the identified vulnerable groups during recovery

5 THE UNDERLYING CAUSES OF VULNERABILITIES EMERGING DURING RECOVERY

In this analysis of the causes of the selected three newly emerging vulnerabilities, we present how a situation is manifest where 1) a lack of long-term planning and undifferentiated aid neglects the diversity of the displaced and leads to deepening dependency; 2) aid delivery in coastal communities adds to pre-existing resource conflicts and community tensions because of highly contested distribution of benefits and coastal zone policies; and 3) the underlying causes of women's abuse are not addressed despite a high awareness of its presence, leading to perpetuation of a culture of gender inequality and marginalisation. Importantly, the causes discussed below, are likely to combine to affect the same group of people living in the coastal zone as the same household or community can be composed of displaced people, fishermen and women.

5.1 Health problems of displaced people: deepening dependency

This section provides a summary of the complex set of factors that contribute to the emergence of the health related problems affecting displaced people. The main factors identified comprise the conditions of the newly created 'artificial' communities, including the quality of shelters and water availability. A lack of long-term planning, and undifferentiated aid delivery which does not acknowledge the diversity of the displaced, are leading to a deepening dependency.

Diseases, shelters, and water in 'artificial' communities,

For displaced people, more than any other group, many detrimental sides of the recovery process are apparent. It was acknowledged early on that new stresses were experienced during the recovery (Mashni *et al*., 2005), and health related risks were anticipated from the outset (e.g. UN, 2005). Consequently, risk profiles for communicable diseases were developed and WHO activated the Global Outbreak and Alert Network (WHO, 2005b). While the displaced people face several risks (Figure 12), which may serve to enhance their sensitivity to health related stresses, including risks of abuse (BDG, 2005), marginalisation (Frerks and Klem, 2005a), and general resource access problems (ICRC, 2005), we focus on the proximate causes for health risks identified in the selected literature.

The conditions in shelters and camps are the main contributor to health problems in the recovery, especially as delays in reconstruction turn 'transitional' shelters into longer term places of residence. Further problems emerge from poor quality shelters (including self-help shelter reconstruction kits) which expose people to heat and monsoon rains (Action Aid, 2005; Unicef *et al*., 2004). As concluded by VanRooyen

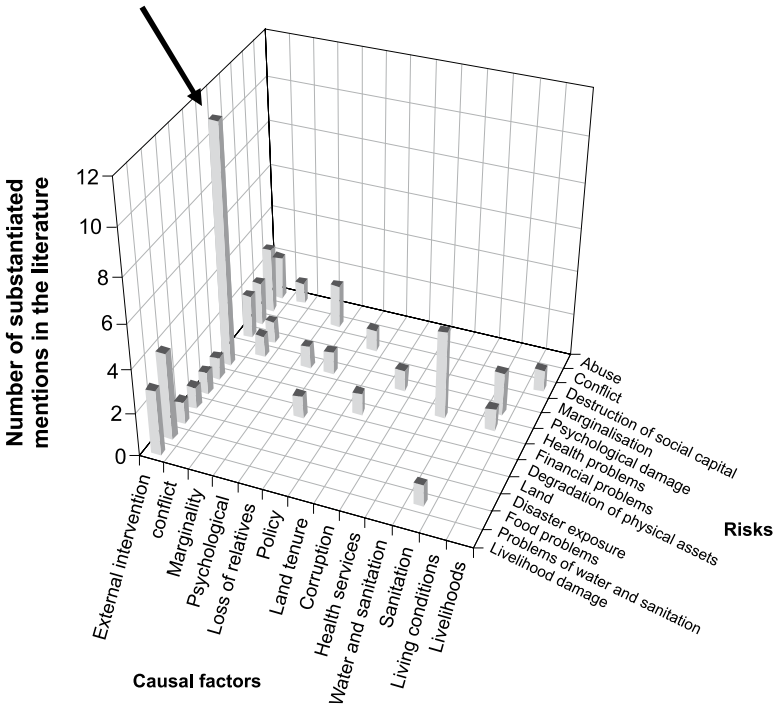

Figure 12: Emerging vulnerabilities experienced by displaced people
Note: We focus here on understanding the dynamics underlying the health risks emerging from the aid delivery (arrow). The same scale on the z axis is used for all three figures in this section, to enable a comparison of the relative attention paid to the three vulnerable groups. Clearly, the displaced people receive most of the attention.

and Leaning (2005, p. 436), 'it is not the disaster but the artificial communities created in their aftermath that serve as substrate for the spread of communicable diseases'.

The provision and availability of water and sanitation have direct impacts on health. Drinking water in particular emerges as a problem when there is insufficient clean water due to a shortage of holding reservoirs and bowsers, and when, in addition, shallow wells near resettlement sites have been salinated (Unicef *et al*., 2004). Overcrowding in shelters, besides furthering the spread of communicable disease (Sida *et al*., undated; WHO, 2005c), is acknowledged as posing a risk of contaminated water, and the available clean water is frequently mismanaged to be used for other purposes than consumption (Mashni et al., 2005).

Poor positioning of camps can lead to a lack of access to health care (Action Aid, 2005), as well as increased exposure to mosquitoes (Briët et al., 2006). Some resettlements have resulted in people being placed in highly exposed areas vulnerable to new coastal hazards, such as flooding (OCHA and UNEP, 2005). In Sri Lanka there have been

cases where people have refused to go or stay in camps because they were located far away from the sea and therefore their livelihoods (Action Aid, 2005).

Lack of coordination, planning and aid differentiation leads to deepening dependency

Health risks are symptomatic of a larger issue of obstructed planning, delays in the reconstruction process, and a lack of coordination amongst the large number of aid donors and aid resources which creates a vicious cycle of increasing dependency. As explained by Action Aid 'displaced people are particularly vulnerable because once they are uprooted they have to cope with geographical, social, cultural and political settings they know little about, and with limited support structures' (Action Aid, 2005, p. 25). The term 'double victimisation' (BDG, 2005) captures this predicament, where the labelling and treatment of the victims as merely 'displaced' acts to detach them from their original identity, social networks and livelihood.

The Transitional Settlement Monitoring Mechanism (TSMM), jointly implemented by the United Nations Office of Recovery Coordinator for Aceh and Nias (OCHA) and Norwegian Refugee Council (NRC) provides one typology for distinguishing between several types of Internally Displaced People (IDPs) and their differentiated needs (UN, 2006). People may be displaced to different places and under different conditions. For example they might be staying in camps or with families or relatives, and be displaced because of the tsunami, or because of underlying conflict or civil war (as in Northeast Sri Lanka and Aceh). The resulting marginalising treatment in the relief phase leads to further stresses associated with the recovery and access to aid (Action Aid, 2005), and may lead to psychological distress (DMIP, 2004), as well as other long-term effects on the population's future options for accessing education (Amnesty International, undated) and sustaining livelihoods.

5.2 Conflict in coastal communities: contested aid delivery and coastal zone policies

The new conflicts in coastal communities and amongst fishermen have emerged predominantly due to the mode of provision of boats and fishing gear, which exacerbate pre-existing resource conflicts and community tensions. The distribution of benefits is criticised by the beneficiaries, and the coastal zone reconstruction policies and their underlying assumptions are contested.

Boats, fishing gear, and resource conflicts

The rebuilding of fisheries by means of provision of boats and fishing gear has proved problematic, leading to the destabilising of communities, and emergence of resource conflicts and jealousies. One of the main causes is the lack of overall standards for compensation (Sida *et al*, undated), and there has been a general inability to distinguish between boat owners and fishermen, and different types of resource uses in fisheries, which compete for the same shrimp and fish stocks (Pauly, 2005; Fox, 2005). As the fishing fleet grows, stocks diminish and fear of increased unregulated competition for

the resources creates further conflict in coastal fisheries (Sellamuttu and Milner-Gulland, 2005). The disproportionate compensation amongst fishing communities has led to highly inequitable situations, where 'small groups of big boat owners and middlemen dominate the fisheries sector and small fishers [are] kept in a constant state of livelihood insecurity' (Shanmugaratnam, 2005). Consequently, post-tsunami fish catch has for some people increased but others are still unable to return to the sea (Action Aid, 2005, p. 36).

The aid delivery feeds into a pre-tsunami situation of over-fishing where a large number of fishermen were in debt to local moneylenders (CGI, 2005). The prioritisation of providing 'fisheries hardware' and subsequent overcapacity in the fisheries sector (NACA *et al*., 2005; GoSL and FAO, 2006; Chreech, 2005) counteracts parallel efforts to combat illegal and unsustainable fisheries (FAO, 2005). In this regard the Ministry of Fisheries and Aquatic Resources (MFAR) in Sri Lanka, supported by FAO, considers a number of actions, including setting limits on the number of coastal fishing vessels allowed. It is recommended that donors and NGOs consult closely with MFAR and FAO before considering further activities in the fisheries sector (GoSL and FAO, 2006).

Contested benefits, claims, and coastal zone policies

Unfair and conflict-insensitive delivery of benefits is a significant cause of local conflict (Sida *et al*., 2005) and underlies much of the emerging controversy in the coastal communities. In several cases the mode of beneficiary identification by the beneficiaries themselves is perceived as indiscriminate and the distribution of aid as irregular (HRCSL and UNDP, 2005). In such a situation false claims are successfully made for fishing gear and boats by people who before the tsunami were not engaged in fishing. On the other hand, donor organizations have been accused of being highly selective in identifying those in need, helping only certain groups within the community (Sellamuttu and Milner-Gulland, 2005).

The above-mentioned shortfalls inherent in the intervention strategies to compensate fishermen and coastal communities must be seen in the context of top-down coastal zone planning. In the last several decades, increasing development in highly exposed coastal environments such as flat and low-lying land, particularly river deltas, estuaries and islands, has considerably increased people's exposure to coastal hazards such as tropical cyclones, tidal surges, tsunamis, and coastal erosion (IFRC, 2005; IUCN-NL *et al*., 2005; Zou and Thomalla, forthcoming). Much of this development has occurred in ecologically sensitive ecosystems such as coastal wetlands, mangroves and sand dunes and has lead to the degradation and destruction of these systems. This in turn is affecting many people in poor coastal communities who depend on the goods and services of these ecosystems for their livelihoods (Adger, 1997). In this historical context, coastal communities have during the post-tsunami recovery been exposed to a rapid change in the legislative and political environment.

The highly contested buffer zone policy supports forced resettlement or eviction from prior, legal or de facto, property with subsequent livelihood damages (AI, 2006; GMSL, 2005). It is associated with significant claims of widespread corruption

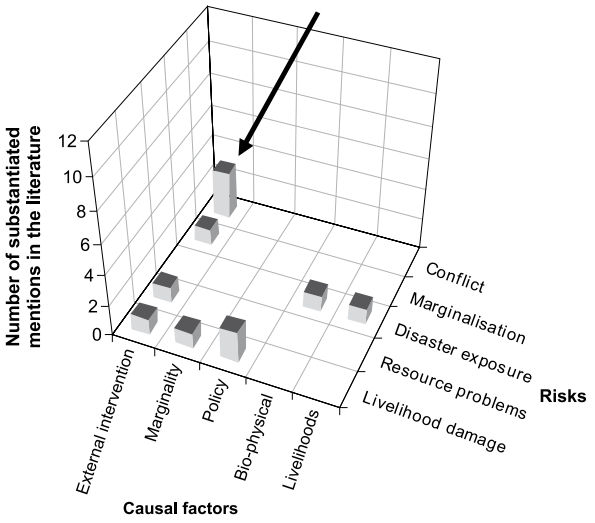

Figure 13: Emerging vulnerabilities experienced by coastal communities (and fishermen).
We focus here on the conflict triggered by the external intervention (arrow)

amongst government officials (Sarvananthan, 2005; WB, 2005a) and consequent emerging distributional issues spurred by the provision of land and housing where strategies do not cater for the post-tsunami uncertainty in property rights (CGI, 2005). It is unfortunate, that whilst corruption is widely accepted as a serious obstacle to the recovery (WB, 2005a; Sarvananthan, 2005), few authors explicitly investigate the issue.

Ecological restoration projects are highly contested in terms of their real value for disaster mitigation. As such, the Recommendations for Action issued at the Asian Wetland Symposium, 2005, advocate ecological restoration for the creation of 'bio-shields' to future coastal hazards (GEC, 2005). Danielsen *et al*. (2005) and Tanaka *et al*. (2006) argue that mangroves and coastal vegetation can significantly buffer inland areas and communities from coastal hazards. In the case of large-scale hazards such as tsunamis, these measures may however have limited effect (RRG, 2005). Indeed, Baird *et al*. (2005) argues that human modifications of reefs have not contributed to the magnitude of the damages observed on land.

When communities' capacity to cope with emerging risk depends on the collectivity of their own agency, including networking between local organisations (ACHR, 2005), the creation of conflicts which destroys this dynamic cooperation contributes to deprive victims of their ability to act and therefore cope. Communities' resilience, i.e. their capacity to cope, adapt to and reorganise after sudden stresses during recovery, therefore depends on working constructively with conflict (UNDP, 2005). The Green Reconstruction Goals as suggested by World Wide Fund for Nature (WWF), aim to 'integrate sustainable fisheries management…in reconstruction efforts' (WWF, 2005,

p. 2), could in this context provide some guidelines, with the emphasis on social stability (goal 3) and minimising the negative externalities of the reconstruction (goal 6). Clearly, as stated by Frerks and Klem (2005), aid should connect rather than divide.

5.3 Abuse of women: a long way from awareness to action

In this section we discuss key factors that contribute to the vulnerability of women to abuse in the post-tsunami context, including camp conditions and the actions of distressed male victims. Noticeably, a situation is uncovered where the underlying causes are not sufficiently addressed despite a generally high awareness of the issues. This leads to perpetuation of a culture of gender inequality and marginalisation.

Direct causes: camps and the actions of distressed male victims

Women are especially vulnerable to violence and harassment in the transitory camps where men can easily have abusive contact with women and girls (Frerks and Klem, 2005), as protective mechanisms have been dismantled (Forum Asia, 2005) and a proper functioning social network necessary to help women recover seldom exists (Southasiadisasternet, 2005). Thus, Action Aid devotes a chapter in their human rights assessment (Action Aid, 2005) to the particular concerns of women, stating that 'vulnerability to sexual violence increases manifold under camp conditions where toilet facilities and living quarters are forced out into the public domain' (p. 46). When the transitory shelter exposes women to an insecure environment (IFRC, 2005) psychological risks emerge. The nature of the displacement camps, with poor water and sanitation facilities, further combine to burden women disproportionately (Action Aid, 2005). Because of a lack of consideration of religious needs, Muslim women are frequently not able to observe the proper mourning period for their family members.

Men are the main instigators of the abuse, driven by traumas from the disaster, and associated reliance on drug and alcohol (Action Aid, 2005). Cases of abuse were even observed during rescue operations situations (FAO, undated). Whilst some men take the role of the violator of women, many suffer from psychological distresses brought about by the death of their wives, immense responsibility as sole care-givers in the family (ADB, 2005b), and, in Sri Lanka, the many additive effects of the internal conflict (AI, Undated). Clearly, men should also equally be seen as a vulnerable group with gender-specific risks (Mattock, 2005), yet this was rarely acknowledged in the reviewed literature.

Perpetuated marginalisation

Whilst acknowledging the central role women and their collective organisation has played in recovery, their continued marginalisation results partly from a larger marginalising cultural and poverty context. Women are left as widowed providers for remaining relatives yet have not been trained in the necessary skills to work. This

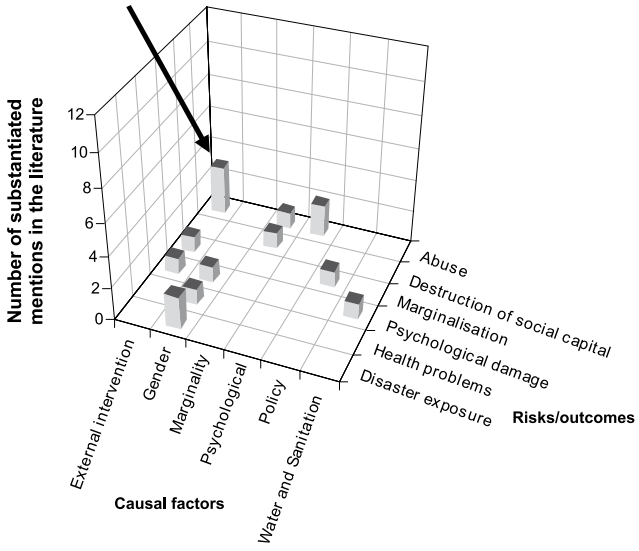

Figure 14: Emerging vulnerabilities experienced by women.
Abuse emerging from the consequences of external intervention is manifest as the dominant source of vulnerability (arrow). Marginalisation and psychological damages comprise other prevalent types of risk

lack of training in skills useful for outside the narrow confines of their household is also manifest in the lack of skills in self-survival which was a key reason for the high death toll of women (HRC and EWC, 2005). Further, the culture of underage marriage, triggered partly by the greater death toll amongst women (FAO, undated; OI, 2005), and many premature pregnancies and the subsequent health risks for young mothers (Action Aid, 2005) contributes further to the marginalisation of women.

The Association of Women's Rights in Development asked if the tsunami could be a platform for social change (Jones, 2005), but the reality appears currently to be the opposite. Aid schemes have found it difficult to target women confined in camps and have limited access to information about their rights. This, combined with unequal access to land for women in general (ADB, 2005b), obstructs their access to land and house ownership (HRC and EWC, 2005). In addition, the legislative environment in the recovery process makes women less able to claim compensation (Action Aid, 2005).

A long way from awareness to action

Gendered challenges in recovery are well appreciated in the research community (Mattock, 2005; Purvis, 2005), and the International Labour Organisation recommends gender sensitive pre-disaster assessments and gender fair interventions in the employer-employee relationship (World Fish Center, 2005). Also the Red Cross advises for gender friendly interventions, including developing an understanding of specific livelihood needs of women by means of greater involvement (ICRC, 2005). Some programs propose approaching the gender issues via an explicit prioritisation of women

as a vulnerable group (Lee, 2005), and agencies like Oxfam and Unifem today include gender advisors in their relief teams to promote gender sensitivity (World Fish Center, 2005). UNDP works via UN-HABITAT in partnership with women in Aceh for housing construction at the village level through community participation (UNDP, 2006a).

Whilst coping strategies of tsunami victims have proved to be gender specific (Mattock, 2005), male attendance at planning meetings is disproportionately greater than women's (Southasiadisaster.net, 2005). It is therefore not surprising that the ADB concludes that 'there has been a general failure to perceive of women not only as victims of the disaster, but also as key actors in shaping the recovery' (ADB, 2005b, p. 6). The limited participation of women in the recovery process is also reflected in a deficiency of gender-specific data. Only two of the documents with primary data found in the review deals with gender in detail, and in Aceh 'relevant sources of information…remain scattered and largely anecdotal' (OI, 2005, p. 5). The collection of gender-disaggregated data in district reports has been noted as an essential starting point to gender-sensitive approaches in Sri Lanka (ADB, 2005b).

Southasiadisaster.net (2005) explains that whilst gender considerations are endorsed by most organisations there is limited evidence for inclusion in actual planning, and there appears, in general, to be a difficulty in translating gender awareness to action in a larger recovery context. Local civil society organisations emphasise the lack of will and capacity to treat women in accordance with the UN Guiding Principles (e.g. AI, 2005), and Forum Asia (2005) argues that the obligation to women, as some of the most vulnerable, has in the post-tsunami recovery been largely ignored. Rising gender awareness and associated difficulty in application reflects, respectively, an increasing recognition of social and underlying causes of vulnerability in the tsunami recovery and the challenges faced when transforming this awareness into action. To enable a better match between awareness, discourse and recovery action one could look to Southasiadisaster.net's (2005) call for agreeing on gender based guidelines which are non-negotiable in every project.

6 LEARNING TO BUILD RESILIENT COASTAL COMMUNITIES

New vulnerabilities have emerged due to, in sum, a lack of planning; limited differentiation of beneficiaries' needs and circumstances; ongoing contestation over claims, assumptions, and policies; and general lack of action on already articulated needs. This suggests that emerging vulnerabilities are the consequence of some higher level disorder in the recovery process. It is appreciated that aid delivery may not currently have the mandate to reduce vulnerability and build resilience, and we do not criticise agencies for something they do not claim to do. However, not considering emerging vulnerabilities is clearly a serious issue hampering the realisation of sustainable recovery in coastal communities, and undermines the links between relief, reconstruction and development, which are sought to be put in place (e.g. Christoplos, 2006b). A greater appreciation of these issues supports the argument that a more coherent mode of coordination amongst actors in the recovery, with strong monitoring and evaluation mechanisms (e.g. Bennet *et al*., 2006; UN, 2005; CGI, 2005, Caritas Internationalis, 2005) needs to be developed. It also supports the call for the increased participation of victims in order to counteract the tendency of marginalisation (e.g. Sellamutu and Milner-Gulland, 2005; Plan International, 2005; UNDP, 2006a).

In situations where, as in the post-tsunami recovery, humanitarian work is driven by a 'voluntary ethos', where 'every organisation defines its own threshold of autonomy and the extent to which it will, or will not, be coordinated by others' (Bennett *et al*., 2006, p. 23), regulatory governance mechanisms do not work well as these rely on a hierarchical decision making structure. When the interaction between actors is governed by a diverse set of relationships which are continually redefined during the recovery experience, social learning can provide a more appropriate approach. The question may not be, as often stated, 'who should control the chaos created by the multiplicity of players' (Bennett *et al*., 2006, p. 23), but how people and organisations involved can, jointly, establish common mechanisms for their assembly and collective action. To appreciate this, we wish to propose an alternative perspective which may more adequately cater to the question of how the agents of recovery can learn to develop cooperative mechanisms for building more resilient coastal communities. To shift focus this act of learning must be in the center, and we need, therefore, to attend to the current obstacles to learning. Taking a social learning perspective, the recovery 'chaos' can instead be considered as a 'community of practice' (Wenger, 1998), which develops and improves its actions through mutual learning in the recovery. Specifically, we therefore need to consider the existing 'community of recovery practice'. Social learning is here employed as a heuristic framework for understanding the current premises for learning, and does not neglect the harsh realities of the recovery context which can be shaped e.g. by armed conflict in Indonesia and Sri Lanka. When considering the 'recovery community' we also emphasise the systemic underlying causes of emerging vulnerabilities, i.e. that a multitude of actors are involved, including both governments and civil society. This highlights the need for

civil society and governments to join forces to address both immediate threats and long-term trajectories of societal deterioration.

In this section, we discuss four aspects of the current recovery community, using Wenger's (1998) theory of social learning (practice, community, meaning, and identity), and its relevance in the context of tsunami recovery (see e.g. ILO, 2005a; IFRCRC, 2006; Shaw, 2006). Understanding the opportunities and challenges within the existing recovery community in enabling and constraining mutual learning to address the shortcomings identified in Section 5 may also assist us in providing some indications as to how new initiatives, such as the joint UN and ProVention Consortium Hyogo Framework for Action 2005-2015, which encourages stakeholder partnerships and multi-level participation, may act as a new platform for collaboration for disaster preparedness in a multi-stakeholder context.

6.1 Practice: operationalising vulnerability analysis for dialogue and action

Learning as doing: Captures an attention to the frameworks and perspectives which are employed when agencies and researchers engage in recovery action (adapted from Wenger, 1998, p. 5).

Vulnerability analysis is not yet mainstreamed

Relief agencies and researchers are working under a lot of stress when forced to make sense of their often very turbulent experiences on the ground. As already mentioned, substantiated vulnerability arguments are in general not used to guide the recovery work, and vulnerability assessment approaches are rarely applied. While the literature search may have missed certain vulnerability assessments, it is significant that only three of the 101 documents with primary data were based on vulnerability analysis: Birkmann *et al*., Miller *et al*., 2006; SEI and SLRC, 2006. However, the abundant use of vulnerability and resilience as descriptors (for example 95 documents employ the term 'resilience') to substantiate arguments show that the use of terminology associated with vulnerability analysis is growing. This might be explained by the fact that mainstreaming vulnerability thinking into the disaster risk reduction community has recently gained momentum through the Hyogo Framework for Action 2050, and that translation of theoretical vulnerability concepts into assessment and operational activities has not yet taken place.

Operationalisation for dialogue and action in disaster risk reduction

Three significant initiatives for operationalising vulnerability and resilience analysis in practice were found in the literature. These include: the vulnerability and capacity assessments employed by Red Cross and Red Crescent Societies in collaboration with SEI (e.g. Fox, 2005; Miller *et al*., 2006); the United Nations University experience with vulnerability assessment (Birkmann *et al*., 2006); and the efforts for incorporating resilience in the USAID IOWTS Program (USAID, 2005) which includes an evaluation of the relative efficacy of different resilience concepts (USAID, 2006). The interest in

vulnerability assessment and mapping appears to be increasing (e.g.Mashni *et al*., 2005). However, whilst vulnerability assessment methodologies have reached a high level of sophistication (e.g. Turner *et al*., 2003), agencies view what is perceived as an extra demand on detail in data and consultation as not always feasible in times of urgency (e.g. Fox, 2005), and the theoretical frameworks are seen as complicated, making them difficult to employ (HRC and EWC, 2005). As such, the vulnerability framework employed can vary, but needs be based on a corresponding justified methodology and application in the disaster context. Yet, methodological innovations with Vulnerability and Capacity Assessment (VCA) (see Hamza, 2006) go some way in addressing these concerns and allow for easier operationalisation of vulnerability analysis.

6.2 Community: politicised aid

Learning as belonging: The community is the social configuration in which the recovery takes place, forming the space in which the worthwhile activities are defined and pursued (adapted from Wenger, 1998, p. 5).

Politicised debate leaves little place for dialogue

An essential dimension of being in a community of recovery practice is that meaning is continuously negotiated. As actors employ diverse perspectives and frameworks for this sense-making (Section 3.1) it is important to have mechanisms which enable them to communicate across potential barriers, and indeed cross-fertilise with new insights. Today, this debate, which determines the ability of the recovery community to continuously re-configure and adapt, is radically shaped by the fact that aid is highly politicised - the debate is characterised more by political positions than by the value of arguments. Further, with allegations of corruption, nepotism, inefficiency and exclusion (Hettige, undated), aid is becoming 'a resource to be controlled by competing political interests and thereby a politicised issue in and of itself' (Frerks and Klem, 2005, p. 19; see also Sida *et al*, undated; RCRC, 2005). Most organisations prioritise accountability to their donors, and indirectly to the general public. Thus there is a tendency to evaluate only their own activities, and few examples could be found of organisations looking beyond their own projects and across organisational boundaries (e.g HPN, 2005).

Positionality counts more than substantiation: Arguing your case from a politicised position

Having a constructive dialogue for collective actions is difficult because each actor is defending their own positions in a highly competitive and politicised environment. The Tsunami Evaluation Coalition concludes that 'little information on methodology is available to judge the validity of the many needs assessments' (De Ville de Goyet and Moriniére, 2006, p. 10), and in general recovery data is perceived as highly contested ('shaky') (Sarvananthan, 2005). Few new data-driven analyses are being made and even the two-year reports include mainly summaries from past work with repetition prevalent. 'Verification' missions do not explain their methods of verification, sections in assessments on methodology are restricted to describing who the agency has met with, and recovery planning does not necessarily rely on the available assessments (e.g.

ILO, 2005b). This contributes to a situation where poorly substantiated information is quickly converted into palatable arguments reaching the widest audiences via news items, agencies' own evaluations and media statements, contributing to the perpetuation of so-called but unsubstantiated and unverifiable 'truths'.

A competitive environment

In the current situation of stifled mutual learning it is, to employ the popularised metaphors, doubtful how real the 'window of opportunity' (Christoplos, 2006a) is for 'building back better' (e.g. Unicef, 2005; WWF, 2005) after the tsunami. The many publications produced on a basis of a strategy of one-way communication show organisations with great urgency to get their message out, to persuade others of their effectiveness rather than seeking a convergence towards collective effort and impact. Trendy rhetoric to satisfy donors and business thinking does its part to shape this situation. Overall, the current conditions result from the pressure to spend donated money and to spend it in a visible way, and the generation of excessive information on programmatic matters (as described in Section 3.1) can largely be seen as the result of accountability concerns due to significant public donations. Many organisations received substantial amounts of funds and are/were under tremendous pressure to spend the money. This has lead to turf wars in which each organization staked out its own territory and where limited incentives exist for organizations to openly monitor and evaluate their own work or that of others. One of the consequences is that 'victims are over-assessed and decision makers under-informed' (Sellamuttu and Milner-Gulland, 2005, p. 2). These concerns have prompted calls by certain stakeholders for the establishment of a global disaster response fund.

6.3 Meaning: early warning misses links to community experience

Learning as experience: Meaning is a way of talking about the changing ability of agencies and researchers to make sense of their experiences, existences and actions in the recovery process (adapted from Wenger, 1998, p. 5).

Large-scale early warning system

Due to its enormous impact, geographical scale, and high public awareness the tsunami stands out from prior disasters such as Hurricane Mitch and the Bangladesh cyclone of 1991, from which the global disaster risk reduction community draws experience. Within organisations high staff turn-over and low institutional memory limit their ability to capitalise on recovery experience (see Miller *et al*., 2005; Christoplos, 2006b). One of the most important manifestations of the current mode of collective sense-making of the recovery is the overwhelming focus on establishing an Early Warning System (EWS) in the Indian Ocean (UN, 2005). The aim of developing a functional, large-scale EWS is based on the assumption that it was a failure of early warning to prevent the disaster in 2004 (ADPC, 2004; Marris, 2006), and it has triggered an 'international data-collection effort in the affected countries' in order to improve the tsunami models in the region (Bhattacharjee 2005, p. 22).

Missing link to communities for disaster risk reduction and preparedness.

When emphasising such a large-scale disaster risk reduction strategy, analyses and arguments are made for national and regional level decision making (Cyranoski, 2005a; 2005b), which are not directly applicable at a local level. Sector aggregated data (e.g. ILO_WPF0105-livelihoods_srilanka) cannot directly inform action at the local level as it lacks a differentiation of social groups within macro data sets and fails to acknowledge particularities of social-ecological systems. It implies taking the tsunami event of December 24 2004 as a definition of a 'starting point' for understanding the vulnerabilities to be reduced in the post-tsunami recovery phase. However, as we have seen in this analysis, and as argued elsewhere (e.g. Adger *et al*., 2005), the vulnerability of social groups exposed during the disaster is inextricably linked to the pre-disaster situation. When disaster preparedness is based on damage assessments and not vulnerability analysis, the cycle of reflection, in understanding the deeper causes of new and emerging vulnerabilities, is bypassed. This is seen in how large-scale disaster risk reduction and warning systems, such as the proposed regional EWS, appears to be largely designed to be founded on a one-way information flow to communities (e.g. Wall, 2005). Consequently, the preparedness, risk perception and experience at the community, and even sub-national, levels is not easily acknowledged.

6.4 Identity: from controllers to enablers of vulnerable groups

Learning as becoming: The recovery work changes the self-perception of people and organisations involved. It includes attention to the developing history of organisations while they learn together (adapted from Wenger, 1998, p. 5).

Command-and-control identity

An emphasis on the actions of aid agencies rather than communities themselves does not easily accommodate an appreciation of local communities themselves as the 'drivers of recovery' (BRR and WB, 2005; WB, 2005a; Harris, 2006); that women's groups are often key agents in their recovery and not just a "vulnerable group" (OCHA, 2005). The view of 'victims' as passive objects dominates in the media (Childs, 2006), and seems only to contribute to retaining people in a situation of powerlessness and marginalisation, which clearly reduces their coping capacities (Birkmann *et al*., 2006, p. 66).

Enabling people's self-organisation and coping

With the increasing employment of participatory approaches (e.g. Iemura *et al*, 2006; HRC and EWC, 2005; EC and IOM, 2005) and acknowledgement of the right of tsunami victims to lead their own recovery (Action Aid, 2005), it follows that agencies and researchers have to reconsider their own role in the recovery. To best support this process, the distinction has to be made that 'being assessed is not being consulted' (de Ville de Goyet and Morinière, 2006, p. 64). Consultation depends on open dialogue. The perpetuation of modes of consultation which have not fully adapted this view of people as agents of recovery contributes to slow recovery (HRCSL *et al*., 2005).

Participation must be meaningful and designed to fit the context and realistic engagement of people (Plan International, 2005). As a time-consuming process, it is tempting to view participatory recovery merely as a means to greater efficiency in implementing project activities (e.g. ACSD, 2005), but there are several dangers involved, however, and the Tsunami Evaluation Coalition concludes that 'too often situation reports and assessments served the interests or mandate of the assessing agency more than those of the potential beneficiaries' (de Ville de Goyet and Morinière, 2006, p. 12). It has been proposed that a centralised beneficiary database be established, entailing the 'deliberate movement from information management to people-centred knowledge management' (de Ville de Goyet and Morinière, 2006 , p. 59). Whilst assessments and measures for participation in recovery may be deemed by some to represent different stages of the recovery, the issue of identity cross-cuts these stages and highlights the continuous need for emancipation.

Vulnerability is partly a subjective characteristic and arguments are only valuable when representing the views and consent of the vulnerable group for which the claim is made. When building back better (EF, 2005; UNICEF, 2005) defining the stresses and causes of vulnerability for a person depends on the view of resilience for this person, i.e. the desired state and assumptions as to how he/she relates to the surrounding environment. The question is clearly whose desired state? As long as the literature continues to be written by observers of the victims and their struggle, for remote decision makers, we are unable to identify the vulnerability and resilience features as they are perceived by the very groups who are asked to act in the spaces of opportunity created by the recovery. As such, it is not possible to recover Sri Lanka's and Indonesia's victims from the tsunami, but to enable them to recover. The Asian Coalition for Housing Rights expressed this very idea when they entitled a special issue of their newsletter 'Housing by People' (authors' italisation) (ACHR, 2005). It is clear that learning to build resilient coastal communities can not be controlled. It emerges from the collective and mutually dependent acts of communities, agencies, researchers, and governments.

6.5 Conclusions from the meta-analysis

This final section presents the conclusions drawn from the meta-analysis of the literature produced within two years of the tsunami and the lessons learned by actors in the aid delivery. Our main findings are as follows:

Understanding vulnerability in the recovery

- There is a shortfall of primary data and substantiated arguments about vulnerability in the recovery.

- This partly depends on a general lack of description of the data generating process, and application of perspectives other than vulnerability for making sense of the recovery.

- Prioritisation of the speed of recovery and catering of information to a competitive environment tends to divert the attention from the vulnerable groups and the underlying causes of risks.

- Hence, these shortcomings of the literature today renders agencies and researchers generally unable to say clearly who is vulnerable, which in turn undermines the ability to conduct recovery planning with specific consideration for vulnerable groups.

Vulnerability lessons drawn

- Of the 11 vulnerable groups identified in the literature, the most vulnerable are: displaced people; women; children; families; farmers; and victims from other emergencies.

- 'Traditional' livelihoods receive more attention in the literature than the strategies of entrepreneurs and people employed in tourism.

- The identified vulnerabilities are predominantly social and institutional in character, not lending themselves easily to analysis in the dominating sectoral and bio-physically oriented assessments.

- Of all the identified risks, most emerged during the recovery, driven by the aid delivery.

Underlying causes of newly emerging vulnerabilities

- An improved degree of long-term planning and differentiation of aid is necessary in order to acknowledge the diversity of displaced people and to prevent deepening dependency during recovery.

- To prevent aid delivery in coastal communities from adding to pre-existing resource conflicts and community tensions, contested benefit distribution and coastal zone policies must be openly debated and fairly resolved.

- Recovery can only act as a platform for social change if the persisting culture of gender inequality and marginalisation is challenged by transforming the high awareness of gender related issues into action.

Learning to build resilience

- Whilst aid delivery may not currently have the mandate to build resilience, a mental and methodological shift has to take place to start considering emerging vulnerabilities which today comprise a serious issue hampering sustainable recovery in coastal communities.

- This shift implies the need for learning amongst recovery actors. Because of the currently limited learning capacity of the recovery community, a social learning framework can assist in realising the operationalisation of vulnerability and capacity assessments.

- The special value of vulnerability assessment in comparison with other sense-making frameworks is that it enables a focus on the vulnerable groups and to give clear and substantiated arguments in relation to underlying causes of negative outcomes on which actions can be based. The need to substantiate, build on primary data, and explicate one's methodology is vital in enabling a constructive data and knowledge driven debate to emerge.

- To develop improved mechanisms for cooperation within the recovery community there is a need to acknowledge and move away from the highly politicised nature of the aid delivery. Transparent assessments of the state of corruption are needed.

- Without holistic people-centred approaches which enable people to take control of their own recovery, there is a continued separation of international response from local response, which also sustains a mismatch between the recovery actions and underlying vulnerability contexts.

- Instead of attempting to control the 'recovery chaos', e.g. by means of a top-down implementation of an Early Warning System, we are faced with a proposition for an alternative identity of actors in the recovery: that of becoming enablers of vulnerable people's recovery, self-organisation and coping.

REFERENCES

ACHR (Asian Coalition for Housing Rights). (2005) Housing by people in Asia. *Newsletter of the Asian Coalition for Housing Rights* 16 (special issue)

ACSD (Asian Civil Society Declaration on Post-Tsunami Challenges). (2005) *Resources available for rehabilitation must be used to help rebuild just and equitable societies.* Press release

Action Aid. (2005) *Tsunami response - A Human Rights Assessment*

ADB (Asian Development Bank). (2005a) *An Initial Assessment of the impact of the Earthquake and tsunami of December 26, 2004 on South and Southeast Asia*

ADB (Asian Development Bank). (2005b) *Rebuilding Sri Lanka: Assessment of Tsunami Recovery Implementation*

ADB (Asian Development Bank), Japan Bank for International Cooperation (JBIC), World Bank. (2005) *Sri Lanka 2005 Post-Tsunami Recovery Program Preliminary Damage and Needs Assessment*

Adger, N.W. (2006) *Vulnerability. Global Environmental Change* 16: 268-281

Adger, N. (1997) *Sustainability and social resilience in coastal resource use*. CSERGE Working Paper GEC: 97-23

Adger, N. W. H.T., Folke, C., Carpenter, S.R., Rockström, J. (2005) Social-ecological resilience to coastal disasters. *Science* 309: 1036-1039

ADPC (Asian Disaster Preparedness Center). (2004) *Lessons Learned from the Tsunami Event December 26, 2004* Case of Sri Lanka.

AI (Amnesty International). Undated. *Sri Lanka Waiting to go home - the plight of the internally displaced.* Draft report.

Alwang, J., Siegel, P. B., Jorgensen, S. L. (2000) *Vulnerability: A View From Different Disciplines*. Washington, D.C, World Bank: 42

ANRHR (Alliance for Protection of National Resources and Human Rights). (2005) *A Response of the Alliance for Protection of National Resources and Human Rights (ANRHR) to What Next? the Civil Society Statement of 26th January (2005*)

AusAID and Care International. (2005) *Rapid Assessment of Western Islands of Aceh 09 - 14 January 2005* (Pulau Simeulue, Kepulauan Banyak & Aceh Singkil) Draft report

Baird, A. H., Campbell, S. J., Anggoro, A. W., Ardiwijaya, R. L., Fadli, N., Herdiana, , Y., Kartawijaya, T., Mahyiddin, D., Pardede, A. M. S. T. Pratchett, M. S., Rudi, E., Siregar, A. M. (2005) Acehnese Reefs in the Wake of the Asian Tsunami. *Current Biology* 15 (21): 19-26

BDG (Bilateral Donor Group). (2005) *Summary report: Bilateral verification mission to tsunami affected districts in Sri Lanka January to February 2005*

Bennett, J., Bertrand, W., Harkin, C., Samarasinghe, S., Wikramatillake, H. (2006) *Coordination of international humanitarian assistance in tsunami-affected countries*. London. Tsunami Evaluation Coalition

Bhattacharjee, Y. (2005) In Wake of Disaster, Scientists Seek Out Clues to Prevention. *Science* 307: 22-23

Birkmann, J., Fernando, N., Hettige, S. Amarasinghe, S., Jayasingam, T., Paranagama, T., Nandana, M. D. A., Nassel, M., Voight, S., Grote, Engle, S., Schraven, B., Wolferts, J. (2006) *Rapid and Multidimensional Vulnerability Assessment in Sri Lanka at the Local Level*

Biondolillo, S. and Widagha, A. (2005) *A public health assessment of Aceh Jaya District*

Briët, O.. Galappaththy, G., Konradsen, F., Amerasinghe, P., Amerasinghe, F. (2005) Maps of the Sri Lanka malaria situation preceding the tsunami and key aspects to be considered in the emergency phase and beyond. *Malaria Journal* 4(1): 8

Briët, O., Galappaththy, G., Amerasinghe, P., Konradsen, F. (2006) Malaria in Sri Lanka: one year post-tsunami. *Malaria Journal* 5 (1): 42

BRR (Badan Rehabilitasi & Rekonstruksi) and World Bank. (2005) *Rebuilding a Better Aceh and Nias Stocktaking of the Reconstruction Effort.* Brief for the Coordination Forum Aceh and Nias (CFAN) - October

Cannon, T., Twigg, J., Rowell, J. 2003. *Social Vulnerability, Sustainable Livelihoods and Disasters*. London, Benfield Hazard Reserach Centre - Report to DFID Conflict and Humanitarian Assistance Department (CHAD) and Sustainable Livelihoods Support Office

Calgaro E. and Lloyd K. (2007) Sun, sea, sand and tsunamis: examining disaster vulnerability in the tourism community of Khao Lak, Thailand, Singapore *Journal of Tropical Geography* (in press)

Care International Indonesia. (2006) *CARE Tsunami Response: Two years in Aceh*

Care, United Nations Office for the Coordination of Humanitarian Affairs (OCHA), Benfield Hazard Research Center. (2005) Draft Field Report: *Rapid Environmental Impact Assessment - Sri Lanka Tsunami*

Caritas Internationalis. (2005) *Rebuilding communities, Restoring lives, Renewing hope – After the tsunami*

CARMA International. (2006) *The CARMA Report on Western media coverage of Humanitarian Disasters*

CGI (Consultative Group on Indonesia). (2005) *Indonesia - Preliminary damage and loss assessment*. The December 2004 Natural Disaster

Childs, M. (2006) Not through women's eyes: photo-essays and the construction of a gendered tsunami disaster. *Disaster Prevention and Management* 15 (1): 202-212

Christoplos, I. 2006a. *The elusive 'window of opportunity' for risk reduction in post-disaster recovery.* Session 3 Discussion Paper. ProVention Consortium Forum (2006) Strengthening global collaboration in disaster risk reduction, Bangkok, February 2-3 2006

Christoplos, I 2006b *Links between relief, rehabilitation and development in the tsunami response*. London: Tsunami Evaluation Coalition

Clasen, T., Smith, L., Albert, J., Bastable, A., Fesselet, J-F. (2006) The drinking water response to the Indian Ocean tsunami, including the role of household water treatment. *Disaster Prevention and Management* 15 (1): 190-201

Cossée, O., Hermes, R., Mezhoud, S. (2006) *Real Time Evaluation of the FAO Emergency and Rehabilitation Operations in Response to the Indian Ocean Earthquake and Tsunami.* Report of the Second Mission. Final version

Creech, S. (2005) *Pre and post tsunami issues affecting fishing communities and the challenges to be addressed if 'build back better' is to contribute towards sustainable livelihood development in the fisheries sector.* Paper presented at the conference Post Tsunami Recovery in Sri Lanka: One Year On With a special focus on Livelihoods Post Tsunami: Build Back Better? 1-2 December, 2005, Colombo

Cutter, S. L. (2003) The Vulnerability of Science and the Science of Vulnerability. *Annals of the Association of American Geographers* 93 (1): 1-12

Cyranoski, D (2005a). Preparations get under way for tsunami warning system. *Nature* 436

Cyranoski, D. (2005b). Solo efforts hamper tsunami warning system. *Nature* 433

Danielsen, F., Sørensen M. K., Olwig M. F., Selvam V., Parish F., Burgess N. D., Hiraishi T., Karunagaran V. M., Rasmussen M. S., Hansen L. B., Quarto A., Suryadiputra N. (2005) The Asian Tsunami: A Protective Role for Coastal Vegetation. *Science* 310: 643

de Ville de Goyet, C. and Lezlie C Morinière. (2006) *The role of needs assessment in the tsunami response*. London: Tsunami Evaluation Coalition

DMIP (Disaster Management & Information Programme). (2004) *Portrait of a disaster. Rapid Assessment Report of the Effects of the Tsunami Crushes in Sri Lanka.*

EC (European Commision) and IOM (International Organization for Migration). (2005) *Settlement and Livelihoods Needs and Aspirations Assessment of Disaster-Affected and Host Communities in Nias and Simeulue*

EF (Environmental Foundation Ltd.) (2005) *Comments on the UNDAC Rapid Environmental Assessment of Sri Lanka February 09 2005*

FAO (Food and Agriculture Organization of the United Nations). Undated. *Different impacts of the tsunami on men and women.* from www.fao.org/sd/seaga

Folke, C. (2006) Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change* 16 2006 253–267

Forum Asia (Asian Forum for Human Rights and Development). (2005) Draft report untitled.

Fox, P. (2005) *Sri Lanka Livelihood Recovery*. Paper for Swedish Red Cross

Frerks, G., Klem, B. (2005) *Tsunami Response in Sri Lanka*. Report on a Field Visit From 6-20 February 2005

Fritz Institute. (2005a) *Recipient perceptions of aid and aid effectiveness: Rescue relief and rehabilitation in tsunami affected Indonesia, India and Sri Lanka*

Fritz Institute. (2005b) *Lessons from the Tsunami: Survey of Affected Families in India and Sri Lanka.*

Fritz Institute. (2005c) *Lessons from the Tsunami: Top Line Findings.*

Galoppin, G.C. (2006) Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change* 16: 293–303

GEC (Global Environment Centre) AWS, (2005) Secretariat, Japan, Wetlands International, Ramsar Secretariat, 2005: *The Tsunami and Coastal Wetlands - Recommendations for Action.* Report on Special Session on Tsunami and Coastal Wetlands, Asian Wetland Symposium 2005 9 February 2005 Bhubaneswar, India

Geist, H., Lambin, E. F. (2002) Proximate Causes and Underlying Driving Forces of Tropical Deforestation. *BioScience* 52 (2): 143-150

GMSL (Green Movement of Sri Lanka). (2005) *Post-tsunami assessment for recovery of agriculture and livestock sectors in Sri Lanka*

GoI (Government of Indonesia, Ministry of Environment). Undated. *Rapid Environmental Impact Assessment – Banda Aceh, Sumatra*

GoSL (Government of Sri Lanka Department of Census and Statistics) (2005) *Census of Persons, Housing Units and Other Buildings affected by Tsunami, 26th December 2004*." http://www.statistics.gov.lk/index.asp

Gunderson, L. H. and C. S. Holling (2002) *Panarchy: Understanding Transformations in Human and Natural Systems*. Island Press

Greenomics Indonesia and WWF (World Wide Fund for Nature) (2005) *Implementation Design - Timber for Aceh Program.* Final Draft

Harris, S. (2006) *The role of local solidarity in Sri Lanka's tsunami disaster response.* HPN - Humanitarian Practice Network. From http://www.odihpn.org/index.asp.

HPN (Humanitarian Practice Network). (2005) *Humanitarian Exchange* 32.

HRC (Human Rights Center) and EWC (East-West Center). (2005) *After the Tsunami. Human Rights of vulnerable populations.*

HRCSL (Human Rights Commission Sri Lanka), Colombo University Community Extension Centre, United Nations Development Programme (UNDP), (2005) *The Report on People's Consultations on Post Tsunami Relief, Reconstruction and Rehabilitation in Sri Lanka*

ICRC (International Committee of the Red Cross) (2005) *Sri Lanka – North East Livelihoods – Assessment Report*

Hamza, M. (2006) *Vulnerability and Capacity Assessment Methodology,* SEI Tsunami Programme unpublished project document, Oxford

Hettige, S. (undated) *Governance, the Ethnic Conflict and the Tsunami Disaster in Sri Lanka.* SEI note

CASERD (Indonesian Center for Agro Socio Economic Research and Development) and Indonesian Agricultural Research and Development - Ministry of Agriculture. (2005) *Food and Labour Market Analysis and Monitoring System in Nanggroe Aceh Darussalam (NAD) Province*

Iemura, H., Takahashi, Y., Pradono, M. H., Sukamdo, P., Kurniawan,.R. (2006) Earthquake and tsunami questionnaires in Banda Aceh and surrounding areas. *Disaster Prevention and Management* 15 (1): 21-30

IFRC (International Federation of Red Cross and Red Crescent Societies). (2005) *Recovery Assessment Team Report Sri Lanka*

IFRCRC (International Federation of Red Cross and Red Crescent Societies (2006) *Tsunami two-year progress report*

ILO (International Labour Organisation). (2005a) *Working Out of Disaster: Improving Employment and Livelihood in Countries Affected by the Tsunami*

ILO (International Labour Organisation). (2005b) *Earthquake-Tsunami Response.* ILO Proposals for Reconstruction, Rehabilitation and recovery

ILO (International Labour Organisation) and WFP (World Food Programme) (2005) *Rapid Livelihoods Household Survey*, ILO/WFP, January 2005 – Main findings

IPS (Institute of Policy Studies). (2005) *Listening to those who lost: Survey and rebuilding and relocation of tsunami affected households in Sri Lanka*

IUCN (World Conservation Union). (2005) *Rapid Environment and Socio-Economic Assessment of Tsunami-Damage in Terrestrial and Marine Ecosystems of Ampara, and Batticaloa Districts of Eastern Sri Lanka*. Draft Report

IUCN-NL (International Conservation union Netherlands), Both Ends, Wetlands International, WNF. (2005) *Coastal ecosystems and livelihoods after the tsunami. Rehabilitation and management of coastal ecosystems after the Tsunami disaster to support local livelihoods, in Sri Lanka, South India, Aceh, Indonesia, Thailand, Malaysia. April 2005 - December 2006*

IWMI (International Water Management Institute). (2005) *Bringing Hambantota Back to Normal - A Post-Tsunami Livelihoods Needs Assessment of Hambantota District in Southern Sri Lanka*

Kerr, A. M., Baird A. H., Campbell, S. J. (2006) Comment on Kathiresan & Rajendran, Coastal mangrove forests mitigated tsunami. *Estuarine, Coastal and Shelf Science* 67: 539-541

Kett, M., Stubbs, S., Yeo, R., Deshpanda, S., Cordeiro, V. (2005) *Disability in Conflict and Emergency Situations: Focus on Tsunami-affected Areas.* IDDC Research Report

Larsen, R. K., Miller, F. Thomalla, F. (forthcoming): *Methodological insights on vulnerability data. Operationalising vulnerability assessment and mapping for disaster recovery*. SEI Working Paper.

Lee, A. C. K. (2005) *Real Time Evaluation of Medair's Tsunami Emergency Response' Programme in Sri Lanka Field visit May 29 - June 9*

Lindskog, E., Dow, K., Axberg, G. N., Miller, F., Hancock, A. (2005) *When Rapid Changes in Environmental, Social and Economic Conditions Converge: Challenges to Sustainable Livelihoods in Dak Lak, Vietnam.* Stockholm Environment Institute

LTTE (Liberation Tigers of Tamil Eelam, Planning and Development Secretariat). (2005) *Post-Tsunami Reconstruction Needs Assessment for the NorthEast (NENA)*

Mashni, A., Reed, S., Sasmitawidjaja, V., Sundhagul, D. Wright, T. (2005) *Multi-Agency Evaluation of Tsunami Response: Thailand and Indonesia*

Marris, E. (2006) Inadequate warning system left Asia at the mercy of tsunami. *Nature* 433: 3-5

Mattock, J. L. (2005) *Resource Loss and Psychosocial Distress: An Application of the Conservation of Resources (COR) Model to the 2004 Asian Tsunami in Sri Lanka*

Miller, F., Thomalla, F. and J. Rockström (2005) Paths to a sustainable recovery after the tsunami. *Sustainable Development Update* 5 (1): 2-3

Miller, F., Hamza, M, Lonsdale, K., de la Rosa, E., Rozable, N. (2006) *Galle Vulnerability and Capacity Assessment Report*

Misselhorn, A. A. (2005) What drives food insecurity in southern Africa? A meta-analysis of household economy studies. *Global Environmental Change* 15: 33-43

NACA, FAO, SEAFDEC, BOBP-IGO. (2005) *Impacts of the Tsunami on Fisheries and Aquaculture Livelihoods - Regional Overview - (As of 3rd February 2005)*

OCHA (United Nations Office for the Coordination of Humanitarian Affairs). (2005a) *United Nations Activities in support of the relief and recovery efforts of the Sri Lankan Government and its People.* Post-tsunami Update July/August

OCHA (United Nations Office for the Coordination of Humanitarian Affairs) (2005b) *Report from assessment of five Temporary Living Centers in Aceh Barat on 15 March 2005*

OCHA (United Nations Office for the United Nations Coordination of Humanitarian Affairs) and UNEP (United Nations Environment Programme). (2005) *Indian Ocean Tsunami Disaster of December 2004*. UNDAC Rapid Environmental Assessment in the Democratic Socialist Republic of Sri Lanka. Joint UNEP/ OCHA Environment Unit

OI (Oxfam International). (2005) *The tsunami's impact on women*. Oxfam Briefing Note

Pauly, D. (2005) Rebuilding fisheries will add to Asia's problems. Overfishing has already caused depletion and conflict. Instead, train people for new jobs. *Nature* 433: 457

Plan International (2005) *Children and the Tsunami. Engaging with children in disaster response, recovery and risk reduction: Learning from children's participation in the tsunami response.*

Powell, N. and J. Jiggens (2003) *Learning from Participatory Land Management*. In: H. A. Becker (ed.): The International Handbook of Social Impact Assessment. Conceptual and Methodological Advances. Edward Elgar Publishing, Cheltenham.

Purvis, J. (2005) The December 2004 Tsunami and the Wider Issue of Making Poverty History. *Women's History Review* 14(1): 5-6

RCRC (Red Cross and Red Crescent Societies). (2005) *Country Strategy and Operational Framework. Sri Lanka. Operation: Earthquake and Tsunamis. Recovery Assessment Team Report February 2005*

Reuters News Service (2005). *Paris Club Agrees Tsunami Debt Freeze*

RRG (Asian Tsunami - Ramsar Reference Group). (2005) Assessment report to Ramsar STRP12. - *Natural mitigation of natural disasters*

Sarvananthan, M. (2005) *Post-Tsunami North & East Sri Lanka: Swindlers hold sway.* PPID Working Paper Series (Working Paper 4)

Scheper, E., Parakrama, A., Smruti, P. (2006) *Impact of the tsunami response on local and national capacities*. London: Tsunami Evaluation Coalition

SEI (Stockholm Environment Institute) and IFRC/SLRC (International Federation of Red Cross and Sri Lanka Red Cross Society). (2006) *Matara Vulnerability and Capacity Assessment Report. Talalla Central GNs, Devinuwara DS, Matara District. 22 - 30 September 2006*

Sellamuttu, S. S. and Milner-Gulland, E. J. (2005) *The Importance of Community Participation and Empowerment in Post-Tsunami Rehabilitation - A Case Study from the Hambantota District in Sri Lanka.* Paper presented during the 4th PEP Research Network General Meeting, June 13-17, 2005, Colombo, Sri Lanka

Shanmugaratnam, N. (2005) *Tsunami Victims' Perceptions of the Proposed Buffer Zone and its Implications in Eastern Sri Lanka*

Shaw, R. (2006) Indian Ocean tsunami and aftermath Need for environment-disaster synergy in the reconstruction process. *Disaster Prevention and Management* 15 (1): 5-20

Southasiadisaster.net (2005) *Special Issue for International Day for Disaster Risk Reduction, October 12, 2005* Tsunami, Gender, and Recovery (6)

Sida (Swedish International Development Agency Cooperation) (2005) *Förslag till inriktning för svenskt stöd till återuppbyggnaden efter flodvågskatastrofen i Asien*

Sida (Swedish International Development Agency Cooperation), Department for International Development (DFID), *Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)*. Undated. Hambantota District Verification Mission February 13-15

SLIM 2004: *Introduction to SLIM publications for policy makers and practitioners.* SLIM Policy Briefing. From: http://slim.open.ac.uk

SLRCS (Sri Lanka Red Cross Society) (2006) Focus (2)

TRO (Tamils Rehabilitation Organisation). (2006) *26 December 2004 - 26 December 2006 – Tsunami: 2 Years On*. A Report from the TRO Board of Governors Kilinochci.

Telford, J., Cosgrave, J., Houghton, R. (2006) *Joint Evaluation of the international response to the Indian Ocean tsunami: Synthesis Report.* London: Tsunami Evaluation Coalition

Tanaka, N., Sasaki, Y., Mowjood, M. I. M., Jinadasa, K. B. S. N., Homchuen, S. (2006) Coastal vegetation structures and their functions in tsunami protection: experience of the recent Indian Ocean tsunami. *Landscape and Ecological Engineering*

Turner II, B. L. (2001) *Vulnerability and resilience for coupled human-environment systems: report of the Research and Assessment Systems for Sustainability Program 2001 Summer study.* Cambridge, Mass., Belfer Center for Science and International Affairs John F. Kennedy School of Government Harvard University

Turner II, B. L., Kasperson, R. E., Matsone, P. A., McCarthyf, J. J., Corell, R. W., Christensen, L., Eckley, N. Kasperson, J. X., Luers, A., Martello, M. L., Polsky, C. Pulsipher, A., Schiller, A. (2003) A framework for vulnerability analysis in sustainability science. *PNAS* 100 (14)

UN (United Nations) (2005) *Regional Workshop on Lessons Learned and Best Practices in the Response to the Indian Ocean Tsunami.* Report and Summary of Main Conclusions. Medan, Indonesia, 13-14 June 2005

UN (United Nations). (2005) *Assessment of Needs of the Tsunami Disaster*, Sri Lanka. Synthesized District Reports as at January 3rd, 2005

UNDP (United Nations Development Programme), Community Initiatives Unit – Indonesia. (2005) *Civil Society in Aceh - An Assessment of Needs to Build Capacity to Support Community Recovery*

UNDP (United Nations Development Programme). (2006a) *UNDP Empowers Women in Post-Tsunami Housing Reconstruction*

UNDP (United Nations Development Programme). (2006b) ERTR News: *Aceh - Nias Emergency Response and Transitional Recovery 1*

UNHRC (The United Nations Refugee Agency) and MRRR (Ministry of Relief Rehabilitation and Reconciliation). (2005) *Refugees and Internally Displaced Repatriation and Returns to and within Sri Lanka.* Statistical Summary as at 31 December 2004

UNICEF (United Nations Children's Fund). (2005) *Building Back Better: A 12-Month Update on UNICEF's Work to Rebuild Children's Lives and Restore Hope since the Tsunami*

UNICEF and UNHRC (The UN Refugee Agency). (2005) *Rapid Assessment: Concerns and Preferences of Tsunami Affected IDPS's in Ampara, Galle and Jaffna Districts*

UNICEF (United Nations Children's Fund), U.S. Agency for International Development (USAID), World Food Programme (WFP), United Nations Refugee Agency (UNHCR), Department for International Development (DFID). 2004. *Rapid Situation and Initial Needs Assessment (RSINA) for the Government of Sri Lanka (GoSL) and UNDP/OCHA in Tsunami Affected District.*

USAID (U.S. Agency for International Development) (2005) *Program summary. US Indian Ocean Tsunami Warning System Program*

USAID (U.S. Agency for International Development (USAID). (2006) US Indian Ocean tsunami warning system (IOTWS) program. *Concepts and practices of 'resilience': a compilation from various secondary sources*

VanRooyen, M. and Leaning, J. (2005) After the tsunami - Facing the public health challenges. *New England Journal of Medicine* 352 (5): 435-438

Wall, I. (2005) *'Where's My House'? Improving communication with beneficiaries: an analysis of information flow to tsunami affected populations in Aceh Province*

Wenger, E. (1998) *Communities of Practice. Learning, Meaning, and Identity.* Cambridge University Press

Wisner, B., Blaikie, P. (2004) *At Risk: natural hazards, people's vulnerability and disasters*. London, Routledge.

WB (World Bank). (2005a) *Rebuilding a Better Aceh and Nias. Preliminary Stocktaking of the Reconstruction Effort Six Months After the Earthquake and Tsunami*

WB (World Bank). (2005b) *Lessons from Natural Disasters and Emergency Reconstruction*

WFC (World Fish Center). (2005) Tsunami - steps towards rebuilding coastal livelihoods. NAGA - *WorldFish Center Quarterly* 28 (1-2)

WFP (World Food Programme). (2005) *Tsunami Emergence Food Security Assessment. Overview of Preliminary Findings.*

WHO (World Health Organisation). (2005a) *Rapid Health Needs Assessment in Galle, Matara, Ampara and Batticoloa*. WHO Sri Lanka – Executive Summary.

WHO (World Health Organisation). (2005b) *Summary table on psychosocial/ mental health assistance to tsunami-affected populations: WHO projections and recommendations*

WHO (World Health Organisation). (2005c) *Rapid Health Needs Assessment in Galle, Hambantota, Matara, Ampara, Batticoloa.* WHO Sri Lanka. Executive Summary

WTO (World Tourism Organization). (2005) *Post Tsunami Re-Assessment – Growing Demand, Limited Supply.*

WWF (World Wide Fund for Nature). (2005) 26th Session of the UNFAO Committee on Fisheries. *Green reconstruction guidelines for assistance to fishing communities, and for rebuilding fisheries and aquaculture sectors in tsunami impacted countries.* WWF Position Paper. March

Yamada, S., Gunatilake, R. P., Yamada, Roytman, T. M., Gunatilake, S., Fernando, T., Fernando, L. (2006) The Sri Lanka Tsunami Experience. *Disaster Management & Response* 4 (2): 38

Ziervogel, G., Bharwani, S., Downing, T.E. (2006) Adapting to Climate Change: Pumpkins, People and Pumps. *Natural Resource Forum*. 30. 294-305.

Zou, L. and Thomalla, F. (2008) *A Synthesis of Insights on the Causes of Social Vulnerability to Coastal Hazards in Southeast Asia.* SEI Poverty & Vulnerability Report, Stockholm Environment Institute, Stockholm, Sweden (forthcoming)

Appendix 1: Search and retrieval of documents

Table A: Searches, conducted October and November 2006

Search engine	Search keywords	Search settings	Comments
Science Direct	'tsunami' + ('Indonesia' or 'Sri Lanka')	all fields	
Springer Link	'tsunami' + ('Indonesia' or Sri Lanka')	all text	
Wiley InterScience	'tsunami' + ('Sri Lanka' or 'Indonesia')	all fields	
BioMed Central Journals	'Tsunami'	all fields	
Blackwell Publishing	'tsunami' + ('Indonesia' or 'Sri Lanka')	all fields	
Taylor and Francis Online Journals	'tsunami'	all fields	
Directory of open Access Journals	'tsunami'	all fields	
Google and Google Scholar	'two years on tsunami report'; 'tsunami Sri Lanka assessment'; 'tsunami Indonesia survey'; 'tsunami Sri Lanka survey'	File-type: pdf	Sampled from first 20 hits
Nature	'tsunami'	all fields	
Science	'tsunami'	all fields	

Table B: Organisations' websites

A significant part of the literature reviewed in this study derives from the so-called grey literature (i.e. unpublished material), and the search for organisations' publications which are available online was conducted by following links from Relief Web, searches on google.com and scholar.google.com (above), and by following links from already identified online sources. We searched the main pages which contained uploaded documents, and followed links to national and regional offices if relevant. Not all of the websites listed below hosted relevant information. The organisations and online libraries and directories included in the search were (with examples of websites searched):

Type of organisation	Institution	Address
Research institutions:	Centre for Humanitarian Dialogue	www.hdcentre.org
	Humanitarian Practice Network	www.odihpn.org
	Stockholm Environment Institute	www.sei.org
	Overseas Development Institute	www.odi.org.uk
United Nations	Food and Agriculture Organisation of the United Nations (FAO)	www.fao.org
	United Nations Development Programme (UNDP)	www.undp.org
	United Nations Environment Programme (UNEP)	www.unep.org
	United Nations Office for Coordination of Humanitarian Affairs (OCHA)	http://ochaonline.un.org
	United Nations Children's Fund (UNICEF)	www.unicef.org
	World Health Organisation (WHO)	www.who.int/en
Development Banks	Asian Development Bank (ADB)	www.adb.org/SoutheastAsia/default.asp
	World Bank (WB)	www.worldbank.org
Development agencies	Swedish International Development Cooperation Agency (Sida)	www.sida.se

	German Technical Cooperation (GTZ)	www.gtz.de/en
	Australian Agency for International Development (AusAid)	www.ausaid.gov.au
	United States Agency for International Development (USAID)	www.usaid.gov
Government (incl. relevant ministries and departments, in English)	Govt.of Indonesia	www.indonesia.go.id/en
	Govt. of Sri Lanka	www.priu.gov.lk
Civil society organisations	Human Rights Watch	www.hrw.org
	Amnesty International	www.amnesty.org
	Red Cross and Red Crescent (International, Sri Lanka, Indonesia, UK, other national societies)	www.icrc.org
	Oxfam International	www.oxfam.org
	ActionAid	www.actionaid.org
	Caritas International and Australia	www.caritas.org
	Care International	www.care-international.org
	Plan International	www.plan-international.org
	World Wide Fund for Nature (WWF)	www.panda.org
	Christian Aid	www.christianaid.org/home.asp
	Mercy Corps	www.mercycorps.org
Other	World Trade Organisation (WTO)	www.wto.org
	International Monetary Fund (IMF)	www.imf.org

Table C: Online directories and other sources

Web addresses
http://www.indonesia-relief.org/
http://www.health.gov.lk/
http://www.reliefweb.int
http://www.tsunami-evaluation.org/home
http://www.aidworkers.net/
http://www.bbc.co.uk
http://www.acehmediacenter.or.id/
http://www.forcedmigration.org/papers/
http://www.gdln.org/
http://www.lankalibrary.com/
http://www.lonelyplanet.org
http://www.proventionconsortium.org/
http://www.eldis.org/
http://www.acehmediacenter.or.id/
http://www.humanitarianinfo.org
http://www.benfieldhrc.org/tsunamis/indian_ocean_tsunami/indian_ocean_tsunami.htm
http://www.wfp.org/policies/Introduction/other/index.asp?section=6&sub_section=1

Appendix 2: Coding and aggregation of vulnerability insights

One example of a substantiated vulnerability insight is listed for each category of risk and causal factor. The insights were coded in accordance with the message as interpreted from the larger text/document.

Table A: Aggregation and classification of risks

Aggregation of risks was conducted according to following categories. Human: psychological damage, health problems; social: abuse, conflict, destruction of social capital, marginalisation; economic: financial problems; ecological-physical: degradation of physical assets, loss of land, disaster exposure, food problems, resource problems, problems of water and sanitation; livelihoods: livelihood damage.

Risk Aggregation	Risk coding	Vulnerability insight	Cause coding	Reference
Human	Psychological damage	Displaced experiencing depression and fear because of uncomfortable living conditions in camps	Living conditions	Mashni et al., 2005
	Health related	Risk of communicable diseases for displaced in overcrowded temporary camps	Aid	Sida et al., 2005
Social	Abuse	Women exposed to sexual violence because of living conditions in temporary camps	Aid	Action Aid, 2005
	Conflict	Increasing conflict over limited coastal resources among fishermen because of false claims and unfair benefit distribution	Aid	Sellamuttu and Milner-Gulland, 2005
	Destruction of social capital	Social disruption for women because of under representation in decision making	Marginality	Yamada et al., 2006
	Marginalisation	Double victimisation of tsunami survivors because of involuntary resettlement	Policy	BDG, 2005

Economic	Financial problems	Households in certain occupations were more at risk of loosing their jobs after the tsunami	Marginality	Birkmann et al., 2006
	Degradation of physical assets	Squatters are not allowed to rebuild because of lacking land ownership	Land tenure	Birkmann et al., 2006
	Loss of land	Land grabbing and loss by displaced people due to failed procedures during land and property restitution claims	Aid	AI, undated
Ecological-physical	Disaster exposure	Communities are exposed to coastal communities because of change of sand dunes and vegetation by infrastructure projects	Bio-physical	Tanaka et al., 2006
	Food problems	Families cannot meet food demands due to loss of livelihoods	Livelihoods	WFP, 2005
	Resource problems	Increased competition amongst fishermen as consequence of provision of coastal fishing vessels	Aid	Sida et al., 2005
	Problems of water and sanitation	Insufficient clean water leads for displaced due to shortage of reservoirs and bowsers in camps	Aid	UNICEF et al., 2004
Livelihoods	Livelihood damage	Unemployment for displaced people as camps are placed far from work opportunities	Aid	Action Aid, 2005

Table B: Aggregation and classification of causes
Aggregation of causes according to following categories: external intervention: aid; human: psychological; social: conflict, gender, marginality, loss of relatives; institutional: policy, land tenure, corruption, health services; economic: financial, trade, poverty; ecological-physical: water and sanitation, bio-physical, salination, disaster exposure, living conditions; livelihoods: livelihoods.

Causal factor Aggregation	Cause coding	Vulnerability insight	Risk	Reference
External intervention	Aid	Risk of communicable diseases for displaced in overcrowded temporary camps	Health related	Sida *et al*., 2005
Human	Psychol-ogical	Men displaced by the conflict and tsunami are unemployed and traumatised, which is resulting in higher levels of alcohol abuse and violence to women and men	Abuse	AI, 2006
Social	Conflict	Cramped living situation in the barracks and the ongoing military presence leads to trauma for the displaced	Psychological damage	HRC and EWC, 2005
	Gender	Women are forced to reproduce to replace lost children and experience increased fear and depressions	Psychological damage	Action Aid, 2005
	Margin-ality	Victims who are politically underrepresented and do not adequately participate in the process of decision making experience social disruption	Destruction of social capital	Yamada *et al*., 2006
	Loss of relatives	Children who loose their family are exposed to psychosocial distress	Psychological damage	ADB *et al*., 2005

	Policy	Buffer zone and involuntary resettlement leads to double victimisation for victims	Marginal-isation	BDG, 2005
	Land tenure	Problematic land tenure status prohibits victims from other emergencies to ransfer cattle back to displaced areas	Resource problems	ICRC, 2005
Institutional	Corruption	Corrupt government officials and 'aid workers means that displaced only receive very poor housing	Degradation of physical assets	Sarvanan-than, 2005
	Health services	The lack of medical services and equipment to support and control the chaos give rise to fear among the communities and the local authorities on outbreaks of e.g. water born diseases	Psychological damage	DMIP, 2004
	Financial	Entrepreneurs have had shops destroyed and animals killed, which make it hard to repay the loan that allowed her start up in the first place	Financial problems	CGI, 2005
Economic	Trade	When the flow of goods, especially from the west coast, has been hampered entrepreneurs go bankrupt	Financial problems	ICASERD and GoI, 2005
	Poverty	Children in poverty after the tsunami are increasingly exposed to trafficking	Abuse	HRC and EWC, 2005

	Water and sanitation	Inadequate functional sanitation exposes the displaced to poor hygiene	Health problems	Lee, 2005
	Bio-physical	The change in coastal vegetation and sand dunes have heightened the exposure of coastal communities to tsunami	Disaster exposure	Tanaka *et al.*, 2006
Ecological-Physical	Salination	The lost rice harvests emerging from the contamination of paddies with salt water and slugs means that farmers become dependent on relief and out-migration	Livelihood damage	GoI, 2005
	Disaster exposure	The inundation led to a loss of farmers land	Loss of land	Care *et al.*, 2005
	Living conditions	Uncomfortable living conditions post-tsunami leads to depression for the displaced	Psychological damage	Care *et al.*, 2005
Livelihoods	Livelihoods	Loss of livelihoods reduce their ability to meet immediate food and non-food consumption needs' (p. 2)	Food problems	WFP, 2005

Appendix 3: Typology and examples of the distinguished document types

The following documents were distinguished by their content and purpose (Fig. A). Distinguishing between 'study reports' (with primary data) and 'syntheses' is not always clear, as some reports present them-selves as 'assessments' but draw solely on secondary data. For instance, the ADB often views desk studies as assessments (ADB, 2005a), whilst in other cases it is not clear whether the assessment uses primary or secondary data (e.g. FAO, undated, UNEP, 2005), which makes it hard to use the document. Often it was hard to identify the source of the information in a specific document, and indeed how the arguments are substantiated. Some documents have titles which imply they contain primary data, but later proved to be impressionistic, a summary study or a discussion piece.

Document content type	Description	Examples
1. Planning documents	Project and concept papers, policy briefings	WB, 2005a Sida, 2005
2. Response updates	Progress reports, public communications, newsletters and news items	UNDP, 2006b SLRCS, 2006
3. Information	News items.	Cyranoski, 2005a Reuters News Service, 2005
4. Scientific	Peer-reviewed, symposium documents,	Briët *et al*., 2006
5. Statement	Position papers, calls, media releases	ANRHR, 2005
6. Synthesis	Reports, notes, papers etc which compile primary or secondary information into syntheses, briefing notes	ADPC, 2004 WB, 2005b
7. Theoretical	Provide a framework for reflecting on and analysing the findings in primary studies	Hamza, 2006
8. Statistical data and maps	Stand-alone data, maps	UNHRC and MRRR, 2005
9. Study report	Presents primary data	Biondolillo and Widagha, 2005 IWMI, 2005
10. Evaluation	Evaluates the recovery efforts of one or more agencies	Cossée *et al*., 2006
11. Other	Stand-alone tables, directories, internal documents	n.a.

Appendix 4: The forty documents with substantiated vulnerability insights

Lead Agency(-ies) and organisation(s)	No. of vulnerability insights	Reference
Action Aid	15	Action Aid, 2005
Amnesty International	12	AI, 2006
East-West Center	11	HRC and EWC, 2005
United Nations University	7	Birkamnn et al. 2006
International Committee of the Red Cross	7	ICRC, 2005
Care International; Oxfam; World Vision	6	Mashni et al., 2005
United Nations Children's Fund (UNICEF); USAID; World Food Programme (WFP); UN Refugee Agency (UNHCR), UK Department for International Development (DFID)	5	Unicef et al., 2004
Swedish International Development Cooperation (Sida); UK Department for International Development (DFID); German Technical Cooperation (GTZ)	5	Sida et al., undated
Pacific Basin Area Health Education Center; World Health Organisation (WHO)	5	Yamada et al. 2006
International Federation of Red Cross and Red Crescent Societies (IFRC)	5	IFRC, 2005
International Water Management Institute (IWMI)	4	Briët et al., 2005
University of Northumbria	4	Mattock, 2005
United Nations Children's Fund (UNICEF); UN Refugee Agency (UNHCR)	4	Unicef and UNHRC, 2005
London School of Hygiene & Tropical Medicine	4	Clasen and Smith, 2005
AusAid; Care International	3	AusAID and Care International, 2005

Disaster Studies, Wageningen University; Clingendael Institute	3	Frerks and Klem, 2005
Bilateral Donor Group, Sri Lanka	3	BDG, 2005
Asian Development Bank (ADB), Japan Bank for International Cooperation (JBIC), World Bank	2	ADb et al., 2005
Bappenas, Government of Indonesia; Consultative Group on Indonesia	2	CGI, 2005
Disaster Management and Information Programme, Government of Sri Lanka	2	DMIP, 2004
Swedish Red Cross Society	2	Fox, 2005
Green Movement of Sri Lanka	2	GMSL, 2005
Ministry of Environment, Government of Indonesia; German Technical Cooperation (GTZ)	2	GoI, 2005
United Nations Office for the Coordination of Humanitarian Affairs (OCHA)	2	OCHA, 2005b
Point Pedro institute of Development	2	Sarvananthan, 2005
Department of International Environment & Development Studies	2	Shanmugaratnam, 2005
The Joint UNEP/OCHA Environment Unit (Joint Unit)	2	OCHA et al., 2005
World Food Programme (WFP)	2	WFP, 2005
Fritz Institute	1	Fritz Institute, 2005b
Fritz Institute	1	Fritz Institute, 2005a
Fritz Institute	1	Fritz Institute, 2005c
Indonesia Center for Agro Socio Economic Research and Development (ICASERD); Government of Indonesia	1	ICASERD and GoI, 2005
International Disability and Development Consortium (IDDC)	1	Kett et al., 2005
Institute of Policy Studies	1	IPS, 2005

World Conservation Union (IUCN)	1	IUCN, 2005
Medair	1	Lee, 2005
Plan International	1	Plan International, 2005
Researchers (ICL)	1	Sellamuttu and Milner-Gulland, 2005
Various research	1	Tanaka et al., 2006
WHO	1	WHO, 2005a
Total	**137 Insights**	**40 documents**

This report surveys an extensive body of literature on the 2004 Indian Ocean Tsunami. It identifies the key contributory factors to vulnerability to the disaster, and examines emerging vulnerabilities in Sri Lanka and Indonesia related to tsunami recovery. Using a social learning approach, the authors argue that the central causes of vulnerability in affected communities are that mechanisms for collective action on recovery are lacking, and that there is limited capacity for learning to build resilience. The report also assesses the role of aid in disaster risk-reduction, and concludes that while it is important in the short-term, it could also play a key role in supporting longer term recovery and the sustainable development of coastal communities. Furthermore, because of its often competitive nature, aid can contribute to rather than reduce vulnerability to future disasters.

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