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STATEMENT OF RESEARCH GAPS IN POST TSUNAMI SRI LANKA

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Executive Summary

This report is based on an extensive literature review and a series of interviews conducted by the EUARSIA team to identify the research gaps related to post tsunami recovery attempts in Sri Lanka.

The findings to date suggest that there are needs in various sectors to carry out research activities:

- **The necessity to recreate public and commercial facilities destroyed during the disaster:** The necessity to recreate the public and commercial infrastructure facilities is vital to re-establish the normal social life within a disaster affected area in long term. Within the context of the post disaster recovery Sri Lanka, this has been identified as a priority area. However, unplanned settlements of affected communities, high population densities, difficulties to relocate affected communities due to long established livelihoods, lack of coordination among relevant authorities, lack of leadership at political level, unrest of habitants when dealing with relocation issues are some of the inhibits of launching successful public and commercial infrastructure facilities recreation problems.

- **Inefficient management and coordination of permanent reconstruction:** Often the attention of international communities and donor agencies are focused on the immediate relieves of effected communities after a disaster. However, the long term recovery and permanent reconstruction are equally important if the post disaster recovery is to be successful. Within post tsunami Sri Lanka some inefficiencies related to the management and coordination of permanent reconstruction have been identified as areas which need further investigation. Those are:

    - Inadequate supervision of contractors by donors
    - Environment was a low priority
    - Poor coordination between housing and required infrastructure
    - Inflexibility with deeds and joint ownership
    - Lack of transparency
    - Poor horizontal communication between GA and local govt.
    - Need for proper resource planning

- **Institutional Capacity Building:** Institutional capacity building has also been identified as a priority development area and pre-requisite for successful post tsunami recovery in Sri Lanka. It has been identified that governmental institutions, Non Governmental Organisations (NGOs) and private sector organisations need to upgrade their capacities in the aspects such as delegation, training, communication, coordination, community consultation and alike.

- **Capacity Enhancements in Higher Education Institutions:** It has been identified that the Sri Lankan higher educational institutions does not process required capacities to cater for the demands of long term post tsunami recovery initiatives. For an example, the country does not have adequate number of postgraduate level courses to produce expertise in subjects such as facilities management and disaster

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management. This is to be addressed urgently with the intention of succeeding the post tsunami recovery in Sri Lanka. In addition to the above main areas, the following have also been identified as potential research areas, while achieving the success in the long term post tsunami recovery in Sri Lanka.

- Environmental knowledge
- Participatory approach in post disaster re-construction
- The need for gender balance
- Role of Women in Disasters
- Professional Skills
- Leadership in International Construction Training and Skill building
- Corporate social responsibility in a disaster for construction and engineering firms
- Waste management
- Information management requirements for post disaster recovery
- Hazard mapping
- Building materials

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Background

This report discusses the research gaps prevail in post tsunami Sri Lanka with reference to the country's long terms disaster recovery efforts. This report has been produced as a part of the EURASIA project funded under the European Commission's ASIALINK programme.

The EURASIA project

EURASIA – EURopean and ASIan Infrastructure Advantage is funded through the Asia Link Programme, dedicated to fostering regional and multilateral networking between Higher Education institutions in the EU and Asia. University Salford is the lead partner of AURASIA with 4 partner institutions working together: Tallinn University of Technology - Estonia, Vilnius Gediminas Technical University – Lithuania, University of Moratuwa – Sri Lanka and University of Ruhuna – Sri Lanka

The overall objective of the project is to foster cooperation in Higher Education institutions in both Europe and Asia, improve reciprocal understanding of cultures, exchange best practice and strengthen mutual awareness of study programmes. The project will achieve this through management of public and commercial facilities and elements of infrastructure (this is referred as FM in this project). The specific objective of the project is to enhance the capacity of the partner institutions for training, teaching and research activities required for the creation and long-term management of public and commercial facilities and elements of infrastructure associated with post-Tsunami activities in Sri Lanka. It will target postgraduate students, and junior and senior faculty members from the EU and Sri Lankan partner institutions, emphasising Asia link programme's objective to provide a framework for activities aimed towards promoting mutual awareness and understanding, exchanges and economics co-operation between the two regions using HE sector to promote EU-Asia relations.

What is disaster?

Disasters can happen any time anywhere in the world. Despite its wide use, the term "disaster" is being used within a broad array of definitions. Perhaps, "what is a disaster" could be the most fundamental question the disaster scholars facing today (McEntire 2001).Within its natural occurrence, the term "disaster" reflects a physical destruction of large scale and / or a large disruption to normal lifestyle of one or more members of the society depend on the scope within which the "disaster" has been identified under the particular circumstance. Related to this, within its academic sense, there have been atteempts to answer the particular question "what is disaster?" (Quarantelli 1985; McEntire 2001)

As (Quarantelli 1985) highlights, the term "disaster" has often been equated with physical agents. For an example, for some, a physical agent such as a tsunami or a hurricane is a disaster. On the other hand, some affiliates the term "disaster" to a physical impact". Within this scenario, the disaster is the after effects of a tsunami or a hurricane rather than the tsunami or the hurricane themselves. In fact, while tracing some earlier discussions and formulations about the term "disasters", (Quarantelli 1998) has noted that the term "disaster" was referred to a physical agent in the past, but along the timeline the use has changed to emphasise the impact. Moreover, (Quarantelli 1985) argues that there are "softer" definitions to disasters. For an example, a disaster can be

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defined in its political sense. In this particular instance, there could be an involvement of a physical agent (natural or manmade: e.g. a hurricane or a riot) but the actual declaration of a "disaster" could be a political decision. Moreover, while assessing the impact of disasters towards the society, (Quarantelli 1985), sees disaster as a social disruption resulting from a physical event. The argument is that, while there may be numerous occasions of physical events leading to disasters, the actual physical event may not be labelled as a disaster, but if the physical event (e.g. earth quake, tsunami, hurricane, etc.) has triggered any disruptions to the social life, that may be regarded as a disaster.

From the above it is clear that, the phenomena of "disaster" may not simply be limited to a physical event, be it natural or manmade. The term "disaster" can be closely attached with the social impact that a destructive physical event can trigger.

Within this socially constructed view on disasters, researchers have regularly considered the imbalance between the social demand (e.g. the magnitude of the physical and social damage need to be rectified by the society) created by a particular incident and capacity of the effected society as a yardstick to measure the "disaster". In this particular view, the emphasis on the classification of a "disaster" largely depend on the fact that how incapable or incapacitated the society to meet the demands set by the incident in question. For an example, Ahrens and Rudolph (2006) claim that 'disasters' as a function of risk process, which is a result of a combination of hazards, conditions of vulnerability and inefficient capacity or measures to reduce the negative consequences of risk. This definition highlights that there is a strong consideration of the capacity of the affected society while determining the actual "disaster". Strengthening the above view, within her search for a definition of "disasters" (Quarantelli 1985) has highlighted, the "imbalance in the demand – capability ratio in a crisis occasion" as a main classification of "disasters" within its social dimension.

Guided by the above socially constructed view of "disasters" this report focuses primarily focuses on the above identified relationship between the disasters and the imbalance between the capacity and the demand within a crisis situation. More specifically, the working definition within the scope of this report and within the scope of the EURASIA project is based on the idea that, the disasters occur in a crisis situation where the demands of the crisis situation out weight the capacities and capabilities of the affected society.

Disaster Management

Managing disasters has been a long established agenda both at strategic and operational levels. This has been an area of investigation to establish effective strategies and working practices to prevent and mitigate the disasters. As mentioned above the term disasters within the above scope denotes, not entirely its physical sense and but its social representation.

Despite "disaster management" has been a popular subject of study within the recent past; there is only little evidence available through literature about studying the disasters from its socially constructed point of view. Moreover, it is further visible that the majority of attempts in this regard have investigated the issue from perspectives of behavioural and health sciences. While the above subject domains remain vital as investigatory points, the role of built environment within the context of disaster management demands due attention. Further, taking the "capacity – demand imbalance" view of the disasters, the role of disaster management seeks proper assessments of demands of crisis situations and the capabilities of the affected societies. Often, in a crisis situation involving physical incidents such tsunamis or riots the largest damage is often applied to

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the built environment. In fact, among others, the biggest demands of a crisis are often attributed to the built environment (e.g. re-establishing the infrastructure needs of the affected society, re-establishment of the basic housing needs of the affected society). This places the need of studying disaster management strategies within the context of built environment as equally important as the aspects such as health care.

The disaster management cycle

Disaster management takes two main approaches to minimize the devastations of disasters. The first approach is a proactive measure, where the strategies and actions about “disaster preparedness” is being evaluated and discussed. The second approach is a reactive approach to investigate how the demands of disasters are to be dealt with after such an incident. Within this reactive approach, often three distinguishable stages can be seen (RICS 2006).

1. Immediate relief
2. Transitional period
3. Medium / Long term recovery

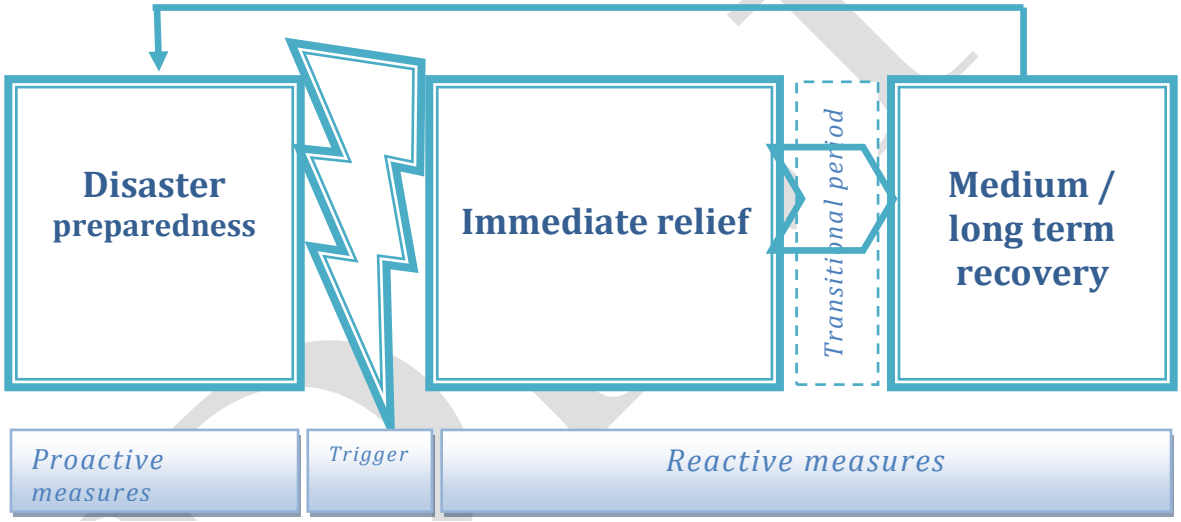

Figure 1 - The disaster management cycle [adapted from (RICS 2006)]

During the immediate relief stage, the focus is on minimizing the devastating effects to the society, thus effectively, minimizing the demands of the crisis. Often, during just after a disaster, relief aids are resourced to the location where the event took place. These relief aids are generally in the form of rescue teams and required physical resources such as rescue vehicles. Along with this generally, the short term relief missions are deployed to control to the crisis level of the effected society .These short term relief missions generally take the form of providing temporary shelter and food to the victims.
Under most of the circumstances and incidents, the immediate relief and short term recovery missions are the main focus of disaster management missions. As a result, often these attempts are well resourced and well managed. However it is visible that, immediate and short term relieves alone are hardly capable of meeting the demands of a disaster, especially in terms of re-establishing the disrupted social activities during a disaster. At the same time, considering the socially constructed view of disasters, the disaster will not disappear from the affected society, until the disrupted social activities of

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the affected community is fully restored. This justifies the importance of the third aspect of the reactive disaster management approach, medium to long term recovery.
Despite the above reality, unfortunately, this is the weakest area of disaster management within current context. Often most of the studies, projects, funds and efforts for disaster management attract the immediate / short term relief stages of the disaster management life cycle mainly due to immediate benefits. Furthermore, as the figure 1 above shows, the long term recovery plans hold the loop to the continuity of the disaster management cycle, linking the proactive and reactive approaches. The main reason behind this is that, the required knowledge for proactive disaster management measures are often created through medium / long term recovery plans, where the required capacities to counter balance the demands of any future disasters can be built. Having identified this requirement, this report specifically focuses on the research gaps in medium to long term disaster management recovery.

The focus

With the light of the above justification, the main focus of this report can be highlighted as to identify the research gap prevail in successfully implementing long term post disaster recovery strategies. Considering operational aspects of this study, the discussion presented below takes the form of a case study effectively analyzing a post disaster recovery scenario in Sri Lanka with special emphasis given to medium / long term recovery.

Methodology

As described above, this study takes the form of a case study investigating a contemporary, context specific issue in detail. This case study has been shaped using the following methodology.

1. The first step of the study was to conduct a comprehensive literature review to identify the nature of the issue being investigated. This literature review provided the basis to identify the gaps in existing literature and helped to narrow down the focus of the investigation while justifying the importance of the knowledge created through the study. Within the scope of the project, this review helped establishing the existing knowledge about the question being investigated. This further helped building the theoretical underpinning of the study, leading to a solid base for the empirical investigations.
2. The third phase was to conduct interviews with relevant parties to collect and validate empirical data about the phenomenon being studied.
3. Finally, the conclusions and outcomes of this study were presented as a report for the benefit of the interested parties.

Within the framework specified above, the next section of the report details the background and the outcomes of the study.

The Indian Ocean Tsunami and the case of Sri Lanka

Sri Lanka is a small island situated closer to southern tip of India near the equator. It is a developing country with the total population just over 20 million. Before the Indian Ocean

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Tsunami, Sri Lanka was known to be a safe haven where outrages of nature scarcely occurred except for occasional floods and landslides. However, the Tsunami affected 75% of the coastline of Sri Lanka. It also resulted in the destruction of more than 100,000 houses (UNEP 2005). The destruction of houses also resulted in discontinuance of several livelihoods such as fishing, farming, tourism and handicrafts-related activities. In addition to commercial and non-commercial property damage, the number of deaths apportioned to the Indian Ocean Tsunami is estimated to be in excess of 130,000 with at least 31,000 of those in Sri Lanka (BBC 2005). Among other reasons, lack of awareness of the nature of a tsunami among the Sri Lankan public is responsible for this mammoth death toll (Karim 2004). Indeed, the term "Tsunami" was heard by most of the ordinary Sri Lankans only after this devastation.

During the immediate relief stage, Sri Lanka has received humanitarian relief aids from the donors all over the world. These aids were in forms of financial assistance, equipment and materials and human resources for rescue / relief missions. While most of these aids were aimed at providing immediate relieves to the victims, some of the funds were meant to be utilized for long term recovery attempts such as reconstruction of houses and infrastructure facilities.

Four years on, Sri Lanka is yet to recover fully from the devastation of the December 2004 tsunami. In fact, after a successful immediate relief phase(Weerakoon et al. 2007), Sri Lanka is going through its transitional period between the immediate relief and the medium / long term recovery. The Sri Lankan government started the long term recovery programmes with optimism and expectations for speedy recovery(Weerakoon et al. 2007). In fact the government has planned the post tsunami recovery programmes to be completed within 3-5 years (UNDP 2006). Further to this optimism, as Weerakoon et al (2007) highlights there were pronouncements at political level about even more speedy recovery intentions, such as to meet all permanent housing needs to be within year after the devastation. However, this target has not been fully met even after 3 years.

With reference to the infrastructure, the pace of recovery of larger scale infrastructure projects, has reported been slow with an estimated 50 per cent of construction projects yet to commence by end 2006 (GOSL 2005). GOSL (2005) further highlighted that, by end 2006, 134 of 182 damaged schools were estimated to be in various stages of construction, however, by the end of 2005, construction work had started only in 18 schools. Similarly, within the health sector only 55 of a total of 102 damaged buildings have been completed by June 2006(RADA 2006; Weerakoon et al. 2007). The above figures show that there is a clear mismatch between the intentions of Sri Lankan government and the actual progress of the post tsunami recovery programmes in Sri Lanka. Having identified this issue, number of recent reports published on the matter of post tsunami recovery Sri Lanka, have cited existing capacity gaps as a main reason which needs to be addressed to ensure the success of post tsunami recovery attempts (GOSL 2005; RADA 2006; UNDP 2006). This justifies selection of the post tsunami Sri Lanka as a case study to investigate the research problem mentioned above.

Built Environment and the role of construction in post tsunami Sri Lanka

The UNEP report (2005) highlights the context in which the current post-Tsunami rehabilitation is operating. Within this report, factors such as the pre-existence of very high densities of unplanned settlements in the southern part of Sri Lanka have been highlighted as having significant influence over the operation of rehabilitation programs. To add to this, the post-Tsunami rehabilitation operations have been affected due to the

lack of response capacities in local government institutions to address needs of such a magnitude. This is mainly because, before the Tsunami, as a 'safe haven' the strategic and operational level capacities of the Sri Lankan institutions responsible for public and commercial facilities were not expected to cater for devastation of this nature or scale. Due to these factors, capacity building has been identified as an important requirement of post-Tsunami rehabilitation in Sri Lanka (GOSL 2005; Weerakoon et al. 2007).

In general capacity building is process or activity that improves the ability of a person or an entity to carry out the stated objectives (LaFond et al. 2002). The primary goal of capacity building is to increase an organisation's access to information and technical know-how by improving internal management structures, processes and procedures, as well as strengthening partnerships among the various players in the development process (Lagcao 2003). Accordingly, the aim of providing access to information and technical know-how within the context of post-Tsunami Sri Lanka largely resides within the capacity and capability of higher education (HE) institutions in Sri Lanka.
In order to achieve the desired capacity and expertise for public and commercial facilities, re-creation, long-term maintenance and management of teaching, training and research will have to be strengthened. Since teaching and training sessions can be more effective in the short term, development of research within the discipline is required to establish the capacity to ensure successful maintenance and management of these facilities continuously. Thus from an academic point of view, the post-Tsunami rehabilitation in Sri Lanka demands an established academic knowledgebase in facilities and infrastructure management.
Facilities and infrastructure management (FM) is frequently described as

..an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organisation in order to create an environment that strongly supports the primary objectives of that organization (Aitkin and Brooks 2000)

The practical and strategic relevance of FM to organisations in all sectors of the economy is now increasingly recognised. FM is not just about the maintenance and operation of buildings, although much of its activities are building-related. More accurately it is about the management of a range of services, of a variety of forms, which are necessary to support the primary activities of an organisation. These services are invariably people intensive, which mean that human resource management issues and the so-called 'soft' issues are highly significant.
However, within Sri Lanka, there are no universities with postgraduate degree programmes in FM. Despite the increasing recognition of the importance of establishing FM as an important knowledge area, it has been identified that the HE institutions in Sri Lanka do not have the required capacities in delivering training, teaching and research extensively in the area of FM in terms of initial local expertise and knowledge. Therefore there is a clear and timely requirement to enhance the capacities and research profiles of Sri Lankan HE institutes to support re-creation and long-term maintenance of the public and commercial facilities and related infrastructure through external (foreign) facilities management expertise.
On the other hand, application of direct foreign knowledge within the given context may not be the ideal solution; there may be mismatches in knowledge application within the Sri Lankan context due to some influential country-specific characteristics such as economic condition, government policies and cultural sensitivity. Therefore it is important to make sure that the capacity building related to the facilities management discipline in Sri Lanka is an attempt to re-create the foreign knowledge within a Sri Lankan-specific

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framework. Within this scope, it is important to indentify the capacity gaps in post tsunami Sri Lankan, hindering the capability of the society to establish a long term recovery. The next part of the report discusses, the specific capacity gaps identified within this context, giving empirical evidence where appropriate.

Research gaps

Within this context, this statement identifies the research gaps as the outcome of the above described investigation. Accordingly, research gaps are identified as a separate section heading, followed by a short description.

The necessity to recreate public and commercial facilities destroyed during the disaster

The estimated cost of post tsunami recovery programmes in Sri Lanka is US$ 2.2 billion, with a large proportion of investments needed for the recovery of housing, tourism, fisheries and transportation (GOSL 2005). Coastal infrastructure, such as roads, railways, power, telecommunications, water supply and fishing ports were significantly affected and demands heavy investments for recovery. Some of these infrastructure facilities have been continuously maintained without any significant capacity upgrade for nearly 100 years. For example, the railway network in Sri Lanka has not been extended since it was introduced under the British rule. Reactions ranged from immediate assistance to communities and local governments in restarting to function as speedily as possible, to short and long-term assistance in supporting communities to rebuild their infrastructure and housing so that they might again have normal lives and eventually recover from the trauma of the tsunami. Even though the immediate priorities of the post-Tsunami recovery activities were centred on the provision of basic requirements such as food, shelter and medicines to affected communities, the necessity to recreate public and commercial facilities destroyed during the disaster cannot be ignored when considering long term recovery measures.

As a part of the EURASIA attempt to understand the problem within the Sri Lankan post tsunami context, number interviews have been conducted with stakeholders who have been engaged with the re establishment of post tsunami public and commercial infrastructure. During such an interview with JICA, the interviewee has highlighted the improper use of land for habitation (prior to the disaster) as a major inhibitor of implementing successful public and commercial infrastructure facilities recreation plans. Some areas were highly dense due to improper resource and infrastructure planning and placements throughout the years, exposing to the habitants to environmental dangers and creating difficulties with infrastructure improvements and maintenance. For an example, the road network within Sri Lanka is in a poor state without proper expansion plans and maintenance strategies. It has often been highlighted that the avenues for the above are limited, due to difficulties of acquiring sufficient lands for road network expansions in highly dense areas. Creating a dilemma, the priority need for such improvements are visible within such highly dense areas, due to the obvious incapacity to cater for the demand of the population density.
After the devastation of the December 2004, tsunami, some of these dense areas were destroyed, creating avenues for proper urban planning strategies. However, the interviewees commended that this was proven to be difficult, due to the long established lively hoods of the habitants who were reluctant to the relocation attempts. Further,

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within the same interview, the interviewee commented that lack of political leadership and unrest of the dispersed habitants created added stress in planning and executing proper commercial and public infrastructure in tsunami affected areas. Furthermore one strong comment was that, some of the affected areas could not be adequately reinstated with appropriate infrastructure due to ethnic problems prevent in some affected areas.

Inefficient management and coordination of permanent reconstruction

(RICS 2006) highlight the inefficient management and coordination of permanent reconstruction as one of the priory areas which needs immediate global attention to ensure successful deployment of disaster management strategies. The need of working out an effective framework for bridging the gap between immediate relief and long term recovery has also been emphasised. It argues that the effectiveness of medium-term recovery and long-term reconstruction is constrained by the lack of planning, co-ordinated management and targeted funding of the response in the post-disaster recovery phase. Immediate relief is often very effective, but it does not guarantee an effective and productive long-term disaster recovery. The same report (RICS 2006) further stresses their responsibility towards promoting the development of a worldwide network of trained professionals, ready to join recovery and reconstruction teams working with affected people.

Stable and secure post-disaster recovery is threatened by institutional constraints, gaps in communication, lack of access to appropriate use of professional skills and knowledge to support local effort, and failures in management and planning. Because of the different types of organisation and interest involved, the link between immediate relief and the longer-term reconstruction is often poorly managed.

With reference to the December 2004 tsunami, it is claimed that Sri Lanka has had a successful immediate relief stage [see: (GOSL 2005; Weerakoon et al. 2007). However, despite that success and despite the generous international funds and help brought in to the country, Sri Lanka has faced the problem of insufficient management and coordination capacities required to launch the permanent recovery attempts (GOSL 2005; Weerakoon et al. 2007).

UN habitat, one of the organisations involved in the post tsunami hosing re-construction has sighted a list of poor management and coordination practices, which lead to unsuccessful post tsunami hosing reconstruction projects. The interviewee of UN habitat informed EURASIA that one of the main factors affected the success of post tsunami housing reconstruction was selection of inappropriate locations. It has further been sighted that often the donors were provided with inappropriate lands to build upon and 5000 homes were built in wrong locations resulted in a misspent of $40 million. During the discussion it has been identified in general that the donor agencies were too ambitious and have under estimated the need for proper coordination to be successful in the reconstruction activities.

Investigating the problem deeply at micro level, the interviewee highlighted few key issues at operational level.

- Inadequate supervision of contractors by donors
- Environment was a low priority
- Poor coordination between housing and required infrastructure
- Inflexibility with deeds and joint ownership
- Lack of transparency

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With all the above issues related to housing reconstruction, the interview with UN habitant brought some concluding remarks to the issue of lacking management capacities for reconstruction in post tsunami Sri Lanka.

- Meaningful consultation required at every level
- Need for proper resource planning – know your customer
- Poor horizontal communication between GA and local govt.
    - Top down approach required but don't have skills
    - Integration of community and environment
    - Unambiguous policies required – don't rush
- Public information campaigns required

In addition to the above the EURASIA's interview with the representative of Red Cross related to the issue of housing reconstruction has highlighted some more operational level management / operational issues. The main issues identified by the Red Cross Interviewee are:

- Lack of quality control
- Poor central statistics / multiple homes for one person
- Lack of professionals – heavily reliant on 2 or 3 consultants, which makes them complacent
- 80% of projects delayed
- ICTAD procurement lists (M1 – M8 etc) not used by NGOs
- Red cross developed its own pre-selection criteria / method
- Exchange rates have led to a 25% increase in prices

This clearly highlights that there is a strong capacity gap in Sri Lanka, both at governmental strategic level and professional operational level with regards to the post disaster reconstruction activities. This issue needs to be addressed adequately if the country needs to be successful with its desperate attempt to recover from the December 2004 tsunami devastation.

Institutional Capacity Building

Recognising the challenges exposed by the recent tsunami Sri Lanka needs to develop a risk management approach, based on the principle that improved institutional capacities are required for improved management of emergency response, particularly at the local level. The following points are be noted within such an approach:

Disaster Management Authority and a system for coordination:

The lessons and experiences of the tsunami relief and recovery coordination should be distilled in developing an appropriate disaster management strategy and an authority that reflects the risks faced by Sri Lanka. A National Disaster Management Plan would clarify roles, responsibilities and streamline coordination across administrative levels and various stakeholders. An emergency relief fund could support the plan for the speed of action during emergencies.

Education and training:

Educating and training of key personnel involved through reactive disaster management plans help to maintain a well functioning system to respond to any future disasters and should involve national, provincial and municipal staff, NGOs and the public. Both the

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public and the authorities will need to understand the basic principles if disaster risk reduction is to take root in the country. Professional education, short training courses, and primary and secondary school books should create awareness and knowledge of hazard risk reduction. National and local authorities should be routinely trained in emergency management as part of their civil servant training and networked to share their experiences.

Knowledge sharing:
International exchange of best practices and knowledge sharing among practitioners, authorities and NGOs, particularly from the region, can significantly contribute to capacity building at all levels.

GOSL (2005) categorises the institutional capacity building required for post tsunami recovery in Sri Lanka under three categories.

1. Capacity building within governmental institutions
2. Capacity building within NGOs, multilateral and bilateral agencies
3. Capacity building within the private sector

GOSL (2005) further highlights few areas where the governmental institutions need to build their capacities upon. Some of those include: line of authority, delegation and devotion, training, communication, coordination, power imbalance, clarity in policy directives and community consultation.
The capacity gaps cited by GOSL (2005) have further been backed by some of the empirical evidences the EURASIA has collected. For an example, during the interview that EURASIA has conducted with UN habitat, the spokes person repeatedly highlighted communication and policy problems that some of the governmental institutions have, was a main inhibit to achieve success in post tsunami recovery programmes.

With reference to the NGOs and other agencies, the main capacity gaps identified were lack of training in local staff, lack of appreciation and knowledge on local society dynamics and lack of absorptive and processing capacity relative to the inflow of funds under some circumstances. For an example, GOSL (2005) highlights the fact that some of the funds received for the recovery programmes could not be utilised within the donor specified time frames due to the lack of funds absorptive and processing capacities shown by the parties involved.

The private sector has received criticisms about its limited understanding and lack of regular coordination between themselves and government agencies within the scope of post disaster recovery in Sri Lanka.

Capacity Enhancements in Higher Education Institutions

With reference to initiatives indicated above, building the educational capacity of the country as a whole is important when establishing a long term strategy to recover from the aftermaths of disasters. This educational capacity building involves raising the awareness of the general public, the next generation (school children) as well as the officials and experts who are responsible for the management of any future disasters. Within the is context, the higher education institutions carries a mammoth responsibility. However, the problem of the current situation in Sri Lankan is that, the Higher

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Educational Institutions (HEI's) show clear capacity gaps hosting the required courses and programmes.
According to the report "Towards safer Sri Lanka : Road map for disaster Risk Management", (MDMHR 2006) an important aspect of any disaster management is to anticipate the requirements for disaster related public awareness, education and training. The major programmes identified under this theme include increase capacity among key institutions through training of officials and training aids/tools. This has led to identification of several major projects to be implemented over the next ten (10) years: (i) Awareness through integration of disaster management in graduate and post-graduate curriculum in University education – Main objectives and activities include organize short courses for university staff, undergraduates and post graduates, Provide training for selected university staff members, Post graduate/post doctoral studies for capacity building in disaster preparedness etc. (ii) Awareness by integrating disaster management training in continuing education - Main objectives and activities include create awareness on disaster risk management issues in professional groups. (iii) enhancing training capabilities - Main objective is to increase capacity of faculty members to obtain knowledge on the state of the art technology and skills related to disaster risk management and enhance resources for training.

Environmental knowledge

The December 2004 tsunami posed great threat to the Sri Lankan environment which had already been identified as volatile. The treat was immense especially along the Sri Lankan costal line (GOSL 2005). Following its own initial humanitarian relief efforts, the IUCN (2005) realized the lack of integration of environmental aspects in post tsunami reconstruction. Further, the Union noted that the capacity and environmental knowledge was insufficient among agencies working to reconstruct affected areas. Therefore, a capacity building programme for government officials and non-governmental organizations was initiated. In addition, the capacity of various relief, reconstruction and rehabilitation organizations – both international and local – as well as communities, to deal with these environmental concerns is also grossly inadequate.

Participatory approach in post disaster re-construction

Studies have shown that it is generally the weaker groups in society that suffer worst from disasters: the poor; the very young and very old; women; the disabled; and, those that are marginalised by race or caste (CII 2005). Preparedness, relief and recovery efforts pertaining to facilities and infrastructure must blend the active efforts of all stakeholders, which include governments, people and international organisations. The strength of the link between these parties forms a critical success factor. Disaster preparedness, response and recovery is a complex problem with a broad and diverse range of stakeholders. ENDEAR will develop capacity to examine the linkages between different stakeholders associated with the protection and reconstruction of facilities and infrastructure prior to and following a disaster. One of the recruited researchers will receive training and support to explore the use of soft-system modelling to break down communication barriers between stakeholder groups and the associated construction disciplines. Data exploration and interpretation, and subsequent analysis will take advantage of the participative, temporal and qualitative nature of soft systems modeling, which can be used to enhance communication and improve decision-making. Fuzzy modelling provides a common language and a shared vision among complex stakeholder groups. It also demonstrates a greater respect for the knowledge and values of local communities affected by disasters, including those local groups from the various

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construction disciplines. Its domain of applicability is not limited. The application of soft systems thinking can provide some initial answers to the question of how to improve communication between heterogeneous groups of stakeholders; it can identify capacity gaps in the process of disaster mitigation, recovery and reconstruction. The key to this process is to involve the stakeholders in defining their current and future needs and priorities, and their own proposed solutions. The significance here is the development of more applicable participatory approaches for collecting, analysing and representing information of multiple stakeholders related to specific facilities and infrastructure. The focus of soft-system modeling is the development of a shared interpretation of a complex problem via personal involvement in modeling. The real power of this approach appears when these relationships are presented in a map form, because then it is relatively easy to see how factors are related, evolving, and how new relationships are formed. Such co-operation is likely to decrease conflicts between stakeholder groups.

Facilities and infrastructure protection, in terms of preparedness actions, needs more community involvement. Communities are largely seen as victims who need help, thus overlooking the contribution they are capable of making in disaster preparedness. A change in the approach towards disaster management is required, where the resourcefulness of 'victims' is recognised, and space given to realise its full potential (Ariyabandu and Wickremasinghe 2005). The second researcher recruited by the network will receive training and support to examine the role of communities as a resource, whereby a decentralised approach towards disaster preparedness and reconstruction is adopted that would provide opportunity for greater involvement of the community, for options, which are cost effective, more appropriate to the local environment, resources, and way of life.

The need for gender balance

ENDEAR will also develop capacity to examine the integration of gender in post-disaster reconstruction, and the need to address the different needs of men and women within a framework of involving and empowering women. Reconstruction will have major impacts on the equal development of women and men, and most importantly, can have a positive impact on increasing access of women to resources, and reducing burdens on their time and labour (UNHabitat 2004). The third researcher recruited by the network will receive training and support to explore the need to promote women's interests in disaster protection and reconstruction of facilities and infrastructure. Capturing knowledge of women's needs is of paramount importance to success in post-disaster reconstruction activities. Participation of women and men equally is also critical for effective crisis programming and for promoting gender equality more broadly. During the reconstruction phase, development of infrastructure and re-establishment of basic services will be a priority. This development will have a major impact on women's lives, in terms of their access to the services that they need the most, and the amount of time it will take them to carry out their daily activities. Women are often left out of planning for reconstruction and therefore the special needs of women and girls are not met – or met as an afterthought (Briceño 2005).

In another respect, the special talents and skills of women are frequently not capitalized upon – wasting a valuable resource14. Women need to enter construction in their thousands every year to solve a growing skills crisis. The fourth researcher will receive training and support from the network to explore the role of women as disaster managers. Despite women's central roles in families, communities, and economies, they are relatively invisible in the world of disaster planning and response and their considerable efforts before, during, and after disasters are masked by the female

victim/male rescuer paradigm. On the other hand, women publicly involved in relief work in non-'traditional' tasks such as building houses and digging wells also often become role models in their communities and reduce barriers to women in the public sphere. Women can use the disaster as an opportunity to change society's perceptions of a woman's capabilities and challenge their gendered roles in society. Rather than being victims, women have their own role in disaster preparedness, recovery and reconstruction associated with facilities and infrastructure, and they can be the key to success and also the agents of change. For example, when hurricane Andrew hit southernmost part of the metropolitan Miami, some women have found employment in construction work, organised work crews and developed new negotiating skills working with home contractors and insurance adjusters. In India, women received skills training in safe housing-construction techniques after the Latur and Gujarat earthquakes, working through community-based women's groups, mitigation agencies and government recovery programmes. They also helped re-design new homes better suited to their needs as workers, whose homes are workplaces as well as residences.

Role of Women in Disasters

Centre for Women Research stresses that it is time for gender issues to be taken into consideration from the pre disaster phase and continue into post disaster relief and reconstruction phases in their article called 'Sthree prabodha'. The development of tools specific to each type of disaster and area would be necessary e.g. mapping of gender relations and time use, assessment of access to and control of resources and the different coping strategies, vulnerabilities and capabilities of men and women. Structures and programmes could then be designed to address their specific needs for protection, assistance, justice and reconstruction. EU discusses how it can further improve its humanitarian response capacity, in particular towards the most vulnerable groups; women and children in Tsunami 2004.

To amplify women's voices to influence recovery policies and agendas, UNIFEM is building the capacity and leadership of women's organizations to advocate for the promotion of women's rights in all reconstruction processes. To ensure that efforts at the policy level are derived from and remain connected to what women are really prioritizing on the ground, major women's consultations were organized in May and June 2005 in Colombo, Sri Lanka, gathering hundreds of women to discuss their concerns and articulate their role in the recovery and rebuilding phase. Besides more immediate concerns about livelihoods, inheritance and property rights, and the creation of adequate settlements and housing, the issue put forward as most critical in the post-emergency phase, was the need for more opportunities for women to interact with local and national authorities, and participate in decision-making to engage with the reconstruction process. To further mobilize and capitalize on local knowledge, the majority of staff in UNIFEM's programme offices in the affected countries were recruited nationally — this has helped significantly in terms of establishing institutional memory and tapping valuable networks to accelerate service delivery.

Advocates have stressed that what is necessary to bring a gender perspective to the study of natural disasters is research and analysis of data disaggregated by sex, pilot projects during the reconstruction phase, an open dialogue within communities and between communities and the national government and capacity-building for women before, during and after disasters have occurred. Finally, an absence of institutional

capacity in gender analysis is reflected in relief efforts, which do not include a gender perspective in their norms and procedures. Again this means that women's particular needs, concerns and their potential for contribution are overlooked during disaster preparedness, response and reconstruction. This also serves to highlight the necessity for an organized, gendered approach to the study of natural disasters and their consequences.

Professional Skills

Disasters and development are inextricably linked, and disaster recovery presents an opportunity to make things better than before for which built environment professionals and their skills are essential. Professionals, with appropriate skills and training, have key roles to play during all disaster phases, from preparedness to immediate relief, transitional recovery and long term reconstruction. There are many gaps that could be bridged by the appropriate use of professional skills, but access to these by the local organisations that are on the front line of the recovery effort is highly constrained by institutional factors, a lack of recognition of their existence and capabilities by international agencies and lack of targeted funding.

In the foreseeable future, in most low-income developing countries like Sri Lanka, professional skills and expertise in the built environment will remain a scarce resource, particularly in the more remote regions. This requires trained built environment professionals to 'think outside the box' and to work with each other, with other professional intermediaries (e.g. the medical profession) and with skilled, non-professional intermediaries, to make the most cost effective use of their existing skills and knowledge. Hence, More intelligent logistical planning, making better use of local knowledge, could release resources for reconstruction. Within all of this, and at every stage, the built environment professions have invaluable expertise and a key role to play. Working in multi-disciplinary teams and with local partners and intermediaries is essential. This kind of activity requires a special and new set of professional skills that need to be shared across all the built environment professions. Construction professionals can lend support to the disaster management process and help overcome the gap between relief and recovery.

There is a growing international consensus that professional expertise is best directed at communities. The long-term aims of disaster recovery and disaster mitigation are consistent to build resilient communities and minimise their vulnerability and risk, and prevent future loss of life and livelihoods.

- The health and education sectors have come under increasing pressure due to lack of funds. This has led to the deterioration of the quality of health and education services. The education sector as a whole needs urgent reform. It is widely accepted that the present system does not provide the kind of education that is relevant to today's needs. This is reflected in the very high unemployment figures for university arts graduates. There is growing concern over the sustainability of these past achievements and on the reliability of some of figures for literacy and educational enrolment (SL Strategy paper).
- There is a strong need to develop consultation mechanisms to include the affected families and civil society organisations in the planning, implementation and monitoring of the recovery. However, to ensure that these consultative

coordination approaches are competently applied, there is a need for strengthening the consultative skills of government officials and to build awareness of this need at both the central and local levels.

Skills are very much essential from preparedness to immediate relief, transitional recovery and long term reconstruction subsequent to a major disaster. Professionals, with appropriate skills and training, have key roles to play during all disaster phases. Many countries are increasingly vulnerable to violent conflicts or natural disasters that can erase decades of development and further entrench poverty and inequality. With a cease-fire between the Government of Sri Lanka and the Liberation Tigers of Tamil Eelam in February 2002 and with Tsunami, Sri Lanka was on course to entering a transition phase from conflict to peace, and from relief to development. There are many skill gaps that must be bridged for an effective economic development and this leads to the necessity of identification of those skill gaps in an appropriate way.

Leadership in International Construction Training and Skill building

The EU construction industry is growing faster than any other major sectors. For example, the construction industry is one of the UK's chief employers, employing over 2 million people, which is more than 1 in 14 of the total UK workforce(CITB 2003). This significant growth of the industry demands a need to recruit skilled workforce at an increased rate. Although all sectors of the industry are expected to see increases in output growth, infrastructure and public housing will be the most buoyant. In the UK only, to deliver the growth and replace those who will leave the industry over the period, an average of 87,600 new workers will need to be recruited per annum. This skill and labour demand may be a threat to the long-term growth of the industry and it may also challenge the industry's capability to deliver the projects on time, within the budget and at the desired quality. The industry cannot simply rely merely on the traditional male workforce to meet these skills and labour requirements. The constant reliance on a limited recruitment base disadvantages the industry by disregarding half the population and the diversity of skills these people have to offer. Women are highly under-represented in construction industry and the low number of women in the industry shows the under utilisation of human resources based on gender patterns. Encouraging the involvement of women in construction is imperative to assure the industry's survival in the long run.

Corporate social responsibility in a disaster for construction and engineering firms

Effective protection and reconstruction of facilities and infrastructure in the event of a disaster will inevitably require interventions by the private and corporate sectors. It can play a leading role in supporting and building the knowledge, capacity and skills of the community in comprehensive risk-based disaster management activities ranging from protection to reconstruction. It can offer human and financial resources and can also be a precious source of technical know-how. However, relationships between private sector organisations and other actors (such as NGOs, the public sector and community organisations) vary considerably in terms of the degree of confrontation and collaboration. These have sometimes been categorised as adversarial, neutral or cooperative, but cover the whole spectrum of corporate social responsibility, including social and environmental impact, business ethics, 'fair trade', labour standards and human rights (Twigg 2001). Private sector and corporate construction and engineering

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organisations always look for ways and means to enhance the brand value of their company and their products and services. It is in this context that corporate social responsibility (CSR) makes good business sense. The value and reputation of a company are increasingly being seen as its most valuable assets for retaining the loyalty and trust of the public to ensure a bright and sustainable future. CSR often refers to profit, environmental quality and social justice, implying that companies' interests are best served by embracing all three. There is widespread acceptance that corporations feel no or little sense of responsibility for solving the world's problems, including those associated with protecting and reconstructing critical facilities and infrastructure in the event of a disaster. However, business advantages associated with CSR include: increased staff morale and motivation that leads to a more committed and productive workforce; enhancement of company brand and reputation; and, a strengthening of relationships with customers, and local and national authorities. Despite this, studies15 suggest that globally the development of CSR has been piecemeal and uneven, with few companies adopting CSR strategies and a substantial gap between rhetoric and practice. The dominant model of economic growth continues to encourage business practices that degrade the environment and disregard stakeholder concerns. CSR is designed to permit the communities of stakeholders to gain, even where business interests and broader social concerns don't necessarily coincide.

Waste management

Construction by nature produces waste. A proper plan is required to manage the construction waste properly, so that the efficiency of the process can be improved. The situation becomes more critical when considering a post disaster recovery situation. The disaster undoubtedly will produce large piles of debris which need to be taken care of before or during the post disaster reconstruction phase.
Within the post tsunami Sri Lanka this was a major issue, the authorities had to deal with even before embarking on reconstruction initiatives. Since the waste was major problem especially within the high dense areas of Sri Lanka, even before the devastation of the Tsunami, this is very much a timely area for research.

Information Management requirements

As discussed above, lack of proper information management strategies related to the disasters and disaster management has been identified as a main capacity gap in post tsunami recovery Sri Lanka. Had there been proper public awareness and information management strategies the fatality rate of the 2004 tsunami could have been reduced drastically. Further, the communication and information barriers between involved parties have continuously been identified as a main reason for less successful post tsunami recovery attempts in Sri Lanka. This highlights that the information management strategies related to disaster management in Sri Lanka is another timely research area.

Hazard mapping

Before the December 2004, Sri Lanka was known to be a safe haven without any natural disasters apart from occasional floods and landslides. However, recently Sri Lanka has been warned in several occasions for tsunami threats. Due to the fact that this is relatively a new trend developing, it is important to take the proactive measures for disaster management through techniques such as Hazard Mapping. As such this again is a timely research area within the context of this report.

Building Materials

The traditional materials used for building construction are becoming increasingly obsolete due to modern construction methods and the developments in building material innovation. The attention of the researchers is on introducing more sustainable building material to reduce the carbon footprints of construction. With regards to disaster management, researches are being carried out worldwide to identify more disaster resistant and less hazardous materials for construction work in disaster prone areas. Since Sri Lanka has recently been identified as a tsunami prone area, it is important the country to pay appropriate attention in developing research in the field of building material to cater for future needs.

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