Capacity Building towards Sustainability: Context of Post Disaster Waste Management

Gayani Karunasena*
Department of Building Economics, University of Moratuwa, Moratuwa, 0094, Sri Lanka

Dilanthi Amaratunga
School of the Built Environment, University of Salford, Salford, 0044, UK

And Richard Haigh
School of the Built Environment, University of Salford, Salford, 0044, UK

ABSTRACT

Concept of Capacity Building is an essential component in development theory and practice. In developing countries, it is identified as a key concept in achieving sustainability. In particular, in post disaster scenarios, focus has been placed upon local capacity building as a means of increasing resilience to natural hazards. In this context, this paper focuses on concept of capacity building and its role on achieving sustainable post disaster waste management. A literature review and pilot study have been conducted to gather information on post disaster waste management in Sri Lanka. Semi-structured interviews were held as the main data collection method and content analysis was used to analyse collected data. Unavailability of a centralized body, poor implementation of rules and regulations; lack of skills and confidence, inadequate funds, lack of communication and coordination were identified as prevailing capacity gaps in post disaster waste management. Thus, finally paper proposes a framework for capacity building for sustainable post disaster waste management.

Keywords: *Capacity building, framework, Disaster waste management, Sustainability,*

1. INTRODUCTION

Concept of capacity building became an essential component in development theory and practice in recent years. Specifically in developing countries it has been identified as a key concept in achieving sustainability (Hartwig *et al*., 2008). Though there is no agreement as to what is meant by sustainability it has been interpreted as ensuring adoption and maintenance of communities and local organizations to cope future challenges while achieving set objectives (Bracht *et al*., 1994). Boyd and Juhola, (2009) indicate that capacity building provides an opportunity to understand strengths, weaknesses, threats and opportunities towards a resilient future through identification of broader issues around sustainable development of a particular program, project or process, including their unique cultural, social, and ecological characteristics.

Webb and Rogers (2003) indicates that capacity building becomes dominant in disaster management, policy and practice, specifically in developing communities more vulnerable to disasters in developing countries. Many argue that developing countries are particularly vulnerable to advance impact of climate change due to poverty, weak governance and ecosystem degradation. Blakely (2007), highlighted that by focusing long-term debris planning and setting measure for ecological and economic sustainability, can improve the region's resilience to future disasters. Furthermore, Deutz and Gibbs (2004) indicates, the expansion of recycling capabilities and eco-industrial planning results in more job creation and promote partnerships. However, building capacity is becoming a challenge

* Corresponding author: E-mail-gayani@becon.mrt.ac.lk, Tel-0094 777 220 877, Fax-0094 11 2650 738

with rapidly changing social, economic and technological drivers, polices and various players involved in disaster management.

This is equally applicable to Sri Lanka where United Nations Environment Protection report (2005) highlighted that debris created by the tsunami of 2004 was not properly disposed, reused or managed. Further, National Symposium on Disaster Risk Reduction and Climate Change Adaptation held in 2009 highlighted undermining sustainable development as a one of the key issues prevailing in Sri Lanka (Munasinghe, 2009). The said speaker further emphasized on adverse impacts of climate change and the role of stakeholders towards sustainable development through research on building local capacities on human skills, technology, data models, methodology etc. In this context, this paper focuses on identification of capacity gaps exists in post disaster waste management and how to enhance capacities towards sustainability.

2. LITERATURE REVIEW

2.1. CAPACITY BUILDING AS A SUSTAINABLE APPROACH

LaFord et al (2002) stated capacity building can be defined as either as a process or outcome activity that improves the ability. He further argued that capacity building can be seen in two extremes where in one extreme resides the increase of knowledge and development of skills of individuals through training programs and the other, in a much broader context which integrates wide range of systems such as policy making, management and finance.

Capacity building has been identified as a key concept in achieving sustainability in developing countries whereas absence of knowledge and practice on sustainable concepts is a major challenge visible in various fields. The report of World Commission on Environment and Development (1987) defined sustainable development as, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Furthermore, many have identified that it does not mean self sufficiency whereas communities need to exchange best practices and there are no environmental impacts, where population growth and economic decentralization may get impacted in absence of any adaptation. In addition, sustainability does not imply change of human spirit, whereas it motivates humans towards actions which will sustain a community (Braden and Van Ierland, 1999). Serageldin (1994) stated that most important element of sustainability is to get institutions right in the sense of engaging all people to overcome consequences of short and long term impacts of social, economic and environmental aspects (Hayles, 2003). However, Hassan (2001) predicted that increasing trends of population growth, consumption of materials and energy, environment degradation and human needs will direct towards non sustainability. This is equally applicable to the context of disaster management with rapidly changing social, economic and technological drivers, polices and various players involved. Next section of the paper discusses capacity building with relation to disaster waste management.

2.2. CAPACITY BUILDING IN POST DISASTER WASTE MANAGEMENT

Kennedy *et al.,* (2008) highlighted the importance of integrating relief and development together by introducing capacity building and capacity development of local and national partners in post-disaster programmes for future resilience. It becomes dominant in disaster management, policy and practice, specifically in developing communities more vulnerable to disasters in developing countries (Webb and Rogers, 2003). Hyogo Framework for Action 2005-2015 (UNISDR, 2005) also highlighted the importance of institutional capacity building to prevent, prepare and respond to disasters to enhance resilience of disaster-affected communities (World Disaster Report, 2004). This means building on existing resilience, which essentially makes an emphasis on enhancing capacity of affected communities to recover with little or no assistance following a disaster (UNISDR, 2005; Tadele and Siambabala, 2009; Haigh and Amaratunga, 2010). Accordingly, in any event, above stand evidence

for importance of addressing all phases of disaster management cycle: Emergency Response and Relief; Recovery and Reconstruction; Mitigation and Preparedness, rather than responding solely to immediate needs of emergency, particularly, making grants to build capacities to enable local communities to develop internally to face future emergency.

In a disaster, generation of waste is unavoidable. Generally, waste is defined as any losses produced by activities that generate direct or indirect costs but do not add any value to the product from the point of view of the client (Formoso et al., 1999) or any substance or object which the holder intends or is required to discard. Peterson (2004) indicated that disaster waste become critical as it differs from the normal situation which generates waste in a more or less stable quantities and composition whereas in a post disaster, it radically changes in type and quantity. Specifically, disaster waste may contain or be contaminated with certain toxic or hazardous constituents. Srinivas and Nakagawa (2007) indicated that disaster debris as the most critical environmental problem faced by countries affected by the Asian Tsunami 2004. Further, General Accounting Office report on *Hurricane Katrina: Continuing debris removal and disposal issues* also highlighted that how failures in disaster debris management continue to impact on environmental health of citizens at the end three years (GAO 2008). Thus, importance of focusing on long term ecological and economic sustainable debris management strategies for resilience to future disasters is emphasized by Blakely in year 2007. Further, Lauritzen, (1998); Baycan and Petersen, (2002) highlighted the need of designing early stage strategies to be managed debris in the most environmentally sound manner through maximizing source reduction and recycling options while minimizing land disposal. Specifically, it is essential for long term peace, stability and security in disaster prone countries, particularly, in developing countries where affected communities rely heavily on natural resources for survival. Thus, it is important to maximize environment sustainable values while minimizing disaster waste generation and impact.

In this context, UNDP (2005, p2) collaboration with external assistance launched "The Tsunami Recovery Waste Management Programme (TRWMP) aiming to build capacity and Poulsen (2007) introduced four streams for capacity building specifically for post disaster waste management in national level institutions. Furthermore, Van der Wel and Post (2007) discussed evaluation measures on capacity building on disaster waste management and Ardani *et al.* (2007) discussed measures to overcome barriers with respect to deconstruction, segregation and sorting, establishment of permanent recycling infrastructure and enhancement of eco-industrial networks. Accordingly, the importance of long-term efforts on capacity building in disaster waste management are vital in order to identify risks, responds appropriately and take measures for sustainable recovery for future resilience.

In Sri Lanka, risk assessments conducted in recent past indicated that most disaster waste management programs conducted at local levels with collaboration of NGOs do not consistently meet current best practices due to lack of readily available guidance, practical procedures and resources (UNDP, 2005;UNEP 2005). In 2007, National Disaster Management Committee of Sri Lanka also indicated that capacities of Sri Lankan institutions are inadequate for successful disaster management (DMC, 2009). Thus, there is a significant necessity to evaluate existing capacities of disaster waste management in Sri Lanka. In this context, forthcoming section of the paper explains research methodology adopted for identification of existing capacities of disaster waste management.

3. RESEARCH METHODOLOGY

Literature review and documentary survey was conducted on capacity building in various disciplines with special emphasise to post disaster waste management to identify capacity building principles, strategies, evaluation measures and challenges. A framework as developed based on these secondary data, which was strengthened by a pilot study using exploratory case studies.

Primary data were collected through several exploratory case studies using interviews. These case studies include both government and non government organisations that involve in disaster waste management at national level in Sri Lanka. A detail of profile of pilot study is illustrated in table 1.

Table 1: Profile of pilot study

Organisation	Type	Designation
Disaster Management Centre	Gov.	Director
Central Environment Authority	Gov.	Director
Cost Conservation Authority	Gov.	Senior Engineer
Solid Waste Management Authority	Gov.	Deputy Director
Sarvodaya Shramadana Movement	Non-Gov.	Manager
International Union for Conservation	Non-Gov.	Coordinator
Sri Lanka RedCross	Humanitarian	DM, Coordinator

Four number of government institutes covering Ministries, Departments, Authorities and three number of non government organisations covering INGOs, NGOs,Humanitarian were selected for data collection. One interviewee from each case was selected from top or middle management involved in post disaster management processes having experience in waste management. Semi-structured interviews were conducted to gather data as it facilitated in depth analysis and gather different views and opinions of respondents within the scope of study.

Content analysis was used in order to analyze collected data. Nvivo software was used for easier and speedy content analysis. Relevant coding structures were prepared using software and analysed in order to determine existing capacities of national organisations. Coding structure prepared mainly focuses on two sections, existing status and issues as illustrated in figure 1.

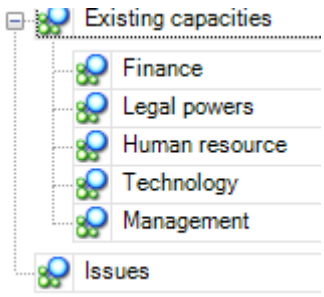

Figure 1: Coding structure

Next section explains the findings of the study.

4. FINDINGS

4.1. EXISTING STATUS

In the case of post disaster waste management, except projects implemented at Amapara and Hambantota districts, there were hardly any others worthy of mention except for the COWAM (Construction Waste Management) training and consulting centre project. It functions as a centre for training and consulting for region as well as to local authorities in the country on sustainable C&D

(Construction and Demolition) waste management which was initiated as a product of the Asian Tsunami of 2004 (Raufdeen, 2009). The main purpose of the project includes collection, sorting and recycling or reuse of construction waste as road construction material. Amapara and Hambanthaota districts' waste projects are targeted at recycling of plastic items and composting of degradable components (Van der Wel and Post, 2007).

Further, in-depth review on national level polices for disaster management (Refer Disaster Management Act no 13 of 2005) and waste management (Refer National Environmental Act 1981) revealed that there are no provisions for disaster waste management. Disaster Management Act only states that disaster management council shall provide protection for environment and maintain and develop affected areas (Disaster Management Act, 2005) whereas National Environmental Act addresses general solid waste management (Raufdeen, 2009). In Sri Lanka, C&D waste is still classified as solid waste as there is are no regulations specifically dealing with C&D waste. Further, National Disaster Management Plan and National Emergency Operation plan in progress which would be enforceable in near future also have less provisions for disaster waste management.

Further, findings revealed that in large scale disasters C&D debris have been managed with the collaboration of national level organizations. Role and functions of an organization in disaster waste management varied based on type of disaster. As a result, organizations do not owing any responsibility over disaster waste made contributions at massive disasters in their own specialized areas. For example, while one organization cleaned roads, another cleared debris from the sea shore. Moreover, some organizations provided equipment and technical knowledge whereas some other organizations gave financial assistance.

4.2. ISSUES

Lack of knowledge and expertise about waste management was one striking factor behind implementation of projects to a wider audience facilitating knowledge sharing and dissemination. In most of the cases, international assistance is sought to recover from such situations whereas local participation, involvement and capacities are either not adequate or not given attention. This is further affected by inadequacy of a regulatory framework and institutional capacity to deal with problems of the country in the past, specially after the tsunami. Further, this was affected by political impacts, civil war and unavailability of pre-defined objectives. In addition, capacity constraints of both government and non - government agencies involved in post disaster management. Line of authority, delegation and devolution, training, communication and information management systems, power imbalances, lack of clarity in policy directives, community consultation, use of indigenous knowledge and people's participation, attention on legal and judicial aspects and awareness raising as key capacity issues noted to be affecting the government sector. Mismatch between large inflow of funds and relatively lesser absorptive and processing capacities, donor deadline requirements within an unusual implementation environment, accountability to donor public of money raised, necessity to spend money quickly, lack of decentralization in decision making, rapid expansion of INGOs and competition between international and local NGOs are some key capacity related issues identified in the non government sector. DMC itself indicated difficulties in executing its tasks due to lack of statutory power vested with it. Additionally, incapacities of transport and communication services, difficulties in recruiting staff, office accommodation and infrastructure development are identified as significant factors having an adverse effect.

Lack of coordination among different level organizations, including government agencies, NGOs, International NGOs and donors appeared to be a common issue. In spite of local contribution, it was observed that external interventions played a significant role in recovery process. However, unavailability of guidance for international donors' (INGOs) affected funding for local NGOs and CBOs which otherwise would have got complemented with capacity building, enhance their abilities to respond and support community development efforts in the long-term.

Accordingly, with reference to findings the status of capacity of post disaster waste management established the necessity of capacity building for sustainable post disaster waste management in Sri Lankan context. Further findings established most capacity requirements identified relate with the functions of national level agencies involved with the disaster waste management, such as planning, coordinating and implementation of statutory enforceable legislations, resources allocation, budget allocation etc. Thus, next explains proposed framework for capacity building for post disaster waste management at national level agencies developed based on secondary data and refined with pilot study findings.

5. PROPOSED FRAMEWORK FOR CAPACITY BUILDING

Proposed framework for capacity building for disaster waste management is illustrated at figure 2. In developing the framework various assumptions were extracted from other sectors such as health and public administration identified through secondary data. Further, proposed framework is refined with accordance to pilot study findings. Capacity building is considered with following characterises for the proposed framework:

- Dynamic and a continuous process.
- Two levels - human resource and organisational, contributing institutional and legal development.
- Shall lead to improvement of performance.
- Shall be influenced by the external environment.
- Contribute towards sustainability.

Accordingly, proposed framework consist with two capacity building levels and seven principles for capacity building towards effective and efficient disaster waste management as illustrated in detail below. This proposed framework will be further enhanced and validated through detailed case studies and expert opinions which are intended to conduct in future. Hence, proposed identical capacity building levels and principles will be established through these findings.

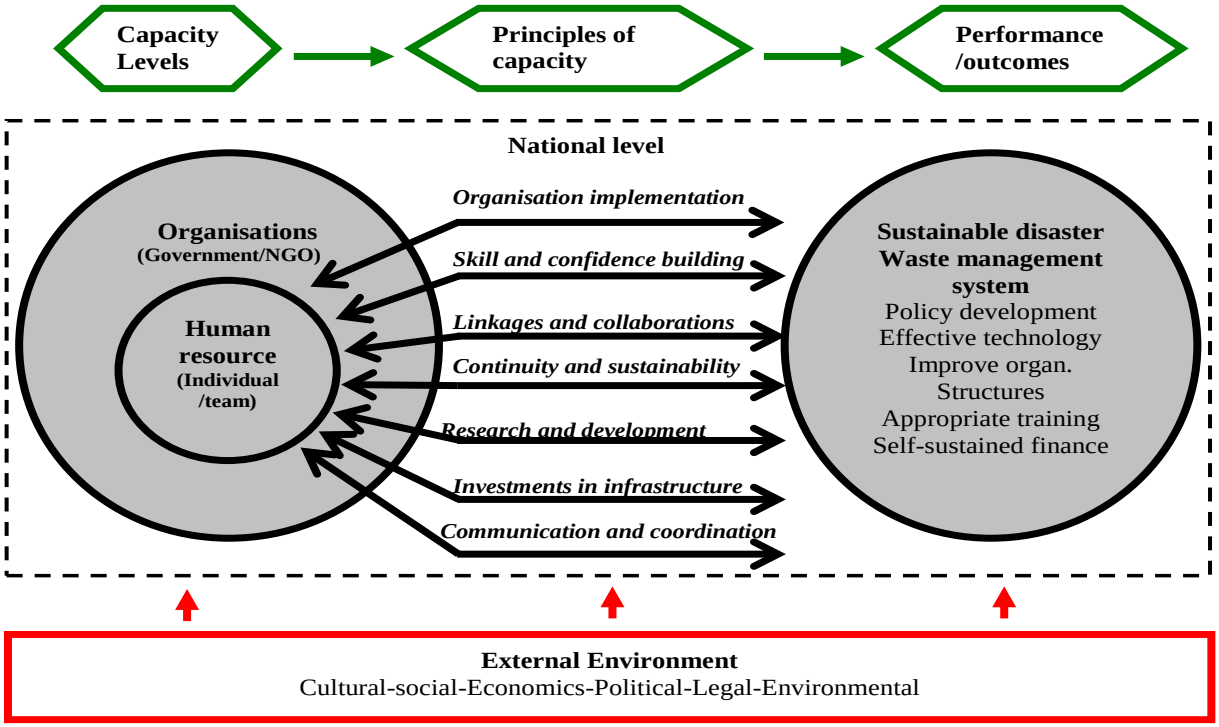

Figure 2: Framework for capacity building for post disaster waste management

5.1. TWO LEVELS OF CAPACITY DEVELOPMENT

Two levels of capacity development known as human resource and organisational levels are identified for capacity building for sustainable disaster waste management. Human resource development (individual & teams) addresses issues pertaining to skills and access to information, knowledge and training that enables to perform functions effectively at national level agencies. Organisational level development focuses on issues pertaining to structures, processes and procedures within organizations and maintaining relationships with other organizations and sectors. Development of these two levels of capacity will eventually lead to establishing statutorily enforceable rules and regulations for sustainable disaster waste management (institutional and legal development) which is not available in Sri Lanka. Though the two levels target different interventions to measure effectiveness it should not be considered in isolation. One level may impact on capacity development and the other can cause a synergistic or detrimental effect on the other.

5.2. PROPOSED PRINCIPLES OF CAPACITY BUILDING

There are seven proposed principles represented by arrows within the diagram which indicates activities and processes that contribute towards capacity building. The arrows cut across structural levels indicating that activities and interventions may occur within, and across, structural levels. The arrow heads point to both directions suggesting that proposed principles applied to each structural level can impact on other levels. Brief description of each proposed principle is explained in table 1.

Table 1: Proposed principles of capacity building

Principles	Description
Skills and confidence building	Focuses on human resources education and training to improve ability to perform functions. Further this involve with developing policies and position statements supporting concepts of career progression, retain employees etc.
Organizational implementation	Focuses on improving organization structures and processes related with disaster waste management. This involves establishing goals, institutional hierarchy for disaster waste management and formal and informal communication
Linkages and collaborations	Focuses on building partnerships and collaborations as a means of building capacities by mechanisms which exchange skills and practice knowledge. The linkages that exist for disaster waste management includes universities, researchers, professional groups, policy makers, UN agencies, government and non government organizations, community groups and different countries.
Continuity and sustainability	Focuses on continuously maintaining acquired skills and knowledge. This can be enabled by providing opportunities to extend skills and experience which may be linked with a concept of career development.
Investments in infrastructure	Focuses on investing in infrastructure to enable smooth and effective management of post disaster waste. Hence, information on calls for funding, fellowships and conferences is important for long term survival.
Research and development	Focuses on developing research capacity in disaster waste management that is useful for practice. This will add new knowledge and inventions close to practice enhancing effectiveness and efficiency of post disaster waste management. This involves creating opportunities for research such as scholarships, funds etc.
Communication and	Focuses on avenues of enhancing communication and coordination capacities of post disaster waste management. This will address issues encountered among non

coordination	government organizations and volunteer groups related to communication and coordination such as non existence of practical guides, transparency and accountability.

As discussed, the proposed framework sets out a tentative structure by which capacity building can be enhanced for disaster waste management.

6. CONCLUSION

Literature and pilot study established the necessity of sustainable post disaster waste management system in Sri Lanka. Among a wide range of approaches, capacity building was identified as the ultimate aim of improved practices which are sustainable. This paper identified values gained by capacity building in general, disaster management and specifically in post disaster waste management. Pilot study revealed unavailability of enforceable legislation, non-availability of institutional framework, lack of coordination and communication, non-availability of district and divisional contingency plans, less political will and inadequate resources including finance, equipments and labour as key capacity gaps prevailing in post disaster waste management. These established the importance of capacity building of post disaster waste management processes through enhancing capacities of individual, organizational, institutional and community levels with skills development, information management and resource acquisition for a sustainable system. Accordingly, paper presents a proposed framework with probable approaches to enhance capacities of national level agencies for effective disaster waste management in Sri Lanka. This framework together with the proposed principles will be further established through detailed case studies in the next phase of this research.

REFERENCES

Ardani, K.B., Reith, C.C. and Donlan, C.J., 2007. Harnessing Catastrophe to Promote Resource Recovery and Eco-industrial Development, Journal of Industrial Ecology, 15(1), 31-50.

Baycan, F. and Petersen, M., 2002. Disaster waste management-C&D waste, *In: ISWA, ed. Annual Conference of the International Solid Waste Association*, 8–12 July 2002. Istanbul, Turkey,117-125.

Blakely, E., 2007. Collaborating to build communities of opportunity, Roosevelt Institute Symposium, November 2007, New Orleans Louisiana.

Boyd, E. and Juhola, S., 2009. Stepping up to the climate change: opportunities in re-conceptualising development futures, Journal of international development, 21, 792–804

Bracht, N., Finnegan, J. R., Rissel, C., Weisbrod, R., Gleason, J., Corbett, J. and Veblen-Mortenson, S., 1994. Community ownership and program continuation following a health demonstration project, Health Education Research, 9, 243–255.

Braden, J.B. and Van Ierland, E.C., 1999. Balancing: the economic approach to sustainable water management, Water Science Technology, 39(5), 17-23

caslebemru@yahoo.com

Deutz, P. and Gibbs, D., 2004. Eco-industrial development and economic development: Industrial ecology or place promotion, Business Strategy and the Environment, 13(5), pp.347–362.

DMC, 2009. Newsletter (1st Quarter): Working together for Disaster Risk Reduction, Disaster Management Centre (DMC): Colombo

Formoso, C.T., Isatto, E.L. and Hirota, E.H., 1999. Method for waste control in the building industry, Proceedings IGLC-7, 7th Conference of the International Group for Lean Construction, 26-28 July. Berkeley: CA Restoring

General Accounting Office, 2008. General Accounting Office reports & testimony. Hurricane Katrina: Continuing debris removal and disposal issues, GAO-08-985R. Washington, DC: GAO.

Haigh, R. and Amaratunga, D. 2010. An integrative review of the built environment discipline's role in the development of society's resilience to disasters, *International Journal of Disaster Resilience in the Built Environment*, 1(1), 11-24

Hartwig, K., Pashman, J. Cherlin, E., Dale, M. Callaway, M., Czaplinski, C., Wood, E. W., Abebe, Y., Dentry, T. and Bradley, E.H., 2008. Hospital management in the context of health sector reform: a planning model in Ethiopia, *International journal of health planning and management*, 23,203–218

Hassan, M., 2001. Transition to sustainability in 21st Century: the contribution of science and technology, *International journal of sustainability in Higher Education*, 2(1), 70-78

Hayles, C., 2003. The role of value management in the construction of sustainable communities, *A world of value conference*, Hong Kong Institute of Value Management, Hong Kong.

Kennedy, J. , Ashmore, J., Babister, E. and Kelman, I., 2008. The Meaning of 'Build Back Better': Evidence from Post- Tsunami Aceh and Sri Lanka, *Journal of Contingencies and Crisis Management*, 16(1), 24-36

LaFond, A.K., Brown, L.B. and Macintyre, K., 2002. Mapping capacity in the health sector: a conceptual framework, *International Journal of health planning and development*, 17, 3-22

Lauritzen, E. K., 1998. Emergency construction waste management,*Safety Science*,30, 45–53

Munasighe, M., 2009.Key note speech: Sustainable hazard reduction and (SHARM) in Sri Lanka. Using sustainomics framework to reduce risk, *National symposium on promoting knowledge transfer to strengthen disaster risk reduction and climate change adoption*, July 2009, Colombo.

Petersen, M., 2004. waste management following disasters, *International conference on post disaster reconstruction*, 22-23 April, UK. Coventry: IF Research group.

Poulsen, S.B., 2007. Report: Examples of capacity building cooperation, *Waste Management & Research*, 25(3), 283–287.

Raufdeen, R., 2009. *Construction Waste Management: Current status and challenges in Sri Lanka*, COWAM publication

Serageldin, I., 1994. *Water supply sanitation and environmental sustainability*, World Bank, Washington.

Srinivas, H. and Nakagawa, Y., 2008. Environmental implications for disaster preparedness: Lessons Learnt from the Indian Ocean Tsunami, *Journal of Environmental Management*, 8(1), 4-13

Tadele, F. and Siambabala, M. A., 2009. Building disaster resilience through capacity building in Ethiopia, *Disaster Prevention and Management*, 18(3), 317-326

UN/ISDR, 2002. *Living with risk: a global review of disaster reduction initiatives*, ISDR Secretariat, Geneva.

UNDP, 2005.*Tsunami Recovery Waste Management Programme (TRWMP) NAD-Nias*, UNDP, Indonesia.

UNEP, 2005. Sri Lanka post tsunami environmental assessment, United Nation Environment Program (UNEP) Geneva: UNEP (DEP/0758/GE)

UNISDR, 2005. Building the resilience of nations and communities to disasters: Hyogo Framework for Action 2005-2015,*World Conference on Disaster Risk Reduction UNISDR*, January 2005.

Van der Wel, A. and Post, V., 2007. *Solid Waste Management in Sri Lanka: Policy & Strategy*, CORDAID Tsunami Reconstruction 4

Webb, P and Rogers, B., 2003. Addressing the "In" in Food Insecurity. Washington, D.C.: Food and Nutrition Technical Assistance (FANTA) Project, Academy for Educational Development (AED)

World Commission on Environment and Development, 1987. Our Common Future (the Brundtland Report), Oxford University Press, Oxford.

World Disaster Report, 2004. *World Disaster Report Focus on Resilience*, International Federation of Red Cross and Red Crescent Societies, Geneva.