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# Book of Abstracts

Tsunami Recovery in Sri Lanka: Ten Years On



**Galle Face Hotel, Colombo, Sri Lanka**  
**5th December 2014**

# TSUNAMI RECOVERY IN SRI LANKA: TEN YEARS ON

## Book of Abstracts

*Edited by*

Professor Siri Hettige, Professor Dilanthi Amaratunga,  
Professor Samantha Hettierachchi and Professor Richard Haigh

Colombo, Sri Lanka, 5th December 2014

Professor Siri Hettige, Professor Dilanthi Amaratunga, Professor Samantha Hettierachchi and Professor Richard Haigh  
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Tsunami Recovery in Sri Lanka: Ten Years On  
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Copies may be ordered by contacting:

Professor Siri Hettige  
Social Policy Analysis and Research Centre (SPARC)  
University of Colombo  
Sri Lanka

Enquiries:  
E: [hettigesiri@gmail.com](mailto:hettigesiri@gmail.com)

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# Tsunami Recovery in Sri Lanka: Ten Years On

## Foreword

The workshop on “Tsunami Recovery in Sri Lanka: Ten Years On” is timely that commemorates the Tenth Anniversary of the Indian Oceanic Tsunami by the Social Policy Analysis and Research Centre (SPARC) Faculty of Arts University of Colombo in collaboration with Global Disaster Resilience Centre at the University of Huddersfield, United Kingdom and Department of Civil Engineering University of Moratuwa. Continuous research on recovery monitoring, interaction among stakeholders, meetings among professionals become highly important to review the progress and lessons learned. This enables countries to create and update their knowledge, effective use of potentials to take up the challenges and meet the new demands in their country in the respective fields and rebuilding of the country.

It is with deep appreciation we recognize the effort by our academic community contributing to make development efforts disaster sensitive ensuring expected investment gains.

This volume while recording the proceedings of the workshop is also expected to lay the ground for effective disaster recovery efforts, which will be invaluable to the responsible state sector as well as non-state sector agencies. At the same time this symbolizes encouragement in multi stakeholders’ participatory and multi-disciplinary decision-making process towards a safer Sri Lanka.



S M Mohamed  
*Secretary, Ministry of Disaster Management*

## Tsunami Recovery in Sri Lanka: Ten Years On



## Preface

Two destroyer waves of Tsunami 2004 caused approximately 40,000 deaths, 120,000 buildings fully or partially damaged and affecting more than 200,000 families leading to the displacement of 516,000 persons, damaging 29,700 fishing vessels, and 90 schools and destroying 92 schools in Sri Lanka. The economic loss was estimated to be around UD 2.2 billion. The catastrophe covered an area from northernmost point of Sri Lanka, the peninsula of Jaffna, the whole of the eastern and the southern coasts up to Colombo in the west coast. The disaster led to a massive response by way of donations, voluntary action, etc. from both within and outside the country as never before in the history of Sri Lanka (Domroes, 2006).

Tsunami relentlessly battered all the existing structures along the coastline along length of approximately 1,000 km out of total of 1,583 kilometers coastline in Sri Lanka. Even if it was a narrow flat coastal strip of land, it caused immense and unbelievable loss of human lives as well as properties due to high population density and high commercialization of the coastal region especially industries, fishery and tourism sector. High population density is largely the result of a favorable public transport infrastructure with main roads, national railway lines that promoted human habitation and commercialization. Among the coastal communities, the severely psychologically affected were fisher folk as the usually hospitable Indian ocean that sustained many of them suddenly became incredibly hostile on that fatal day.

Tsunami 2004 is the biggest natural disaster in the country's recorded history. Assistance rushed in from local communities, government, private sector, non-governmental organizations and international communities. A Centre for National Operations (CNO) was formed under the President as an initial step to coordinate relief efforts that came in. By November 2005 all government agencies working on tsunami consolidated into a single agency called Reconstruction and Development Agency (RADA). Simultaneously, the government appointed a "Parliamentary Select Committee on Natural Disasters" to identify ways to improve the Disaster Management in the country. This committee recommended the Disaster Management Act which was enacted in May 2005. The apex body of Disaster Management in the country is the National Council for Disaster Management (NCDM) Chaired by H.E. the President. The Ministry of Disaster Management is responsible for policy formulation and providing necessary guidance to the relevant agencies such as Disaster Management Centre (DMC), Department of Meteorology, National Building Research Organization (NBRO), and National Disaster Relief Services Centre (NDRC) under its umbrella. The Disaster Management Centre (DMC) has the responsibility of implementing provisions of the Disaster Management Act. At present, Sri Lanka Comprehensive Disaster Management Programme (2014-2018) is developed by the Ministry of Disaster Management with the support of DMC and UNDP Sri Lanka and in consultation with all relevant stakeholders as the country's disaster risk reduction investment plan for next five years.

Many studies have been undertaken following the disaster to determine the nature and extent of recovery from the disaster in terms of resettlement, restoration of livelihoods, recovery from mental trauma, community building, etc. The present workshop is organized to commemorate the Tenth Anniversary of the Indian Oceanic Tsunami in Sri Lanka and the main question that we pose is: where do the victims of the Tsunami stand today after ten years of the event? We attempt to answer this question from a multidisciplinary angle focusing on key areas such as social cohesion, livelihood restoration, social infrastructure, gender, psychological well-being, impact on vulnerable groups, early warning mechanisms and reconstruction as elaborated in the concept note

The list given above is not exhaustive but covers most of the important aspects of recovery. It is hoped that the deliberations based on largely empirically oriented papers would lead to a set of conclusions and recommendations providing the basis for further action in terms of better policies, interventions and research.

Professor Siri Hettige  
*Senior Professor of Sociology, University of Colombo, Sri Lanka*

## Tsunami Recovery in Sri Lanka: Ten Years On

## Acknowledgements

This is an expression of gratitude to those who have offered their assistance and support, as well as gave advice and suggestions of major importance.

*Our special thanks to Prof Dilnathi Amaratunga and Prof Richard Haigh Co-Directors of Global Resilience Centre University of Huddersfield, United Kingdom for extended their fullest technical and financial support extended organizing this workshop and publishing the book of abstracts through a project grant made from CASCADE Project (European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 609562).*

We express our sincere thanks to Prof Ranjith Senaratne, Vice Chairman, University Grants Commission, Sri Lanka for the countless contribution supporting the idea of tsunami recovery efforts through an academic lens.

We thank Ms. S M Mohamed, the Secretary, Ministry of Disaster Management for encouraging academic contributions in all disaster resilience efforts.

It is with deep appreciation the generous and timely advices, guidance and support extended by Professor S S L Hettiarachchi, Senior Professor of Civil Engineering, University of Moratuwa in order to streamline this whole exercise successfully.

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We are grateful to Dr Ananda Mallawathantri, Country Representative, IUCN Sri Lanka, Major General Gamini Hettiarachchi, Disaster Management Centre, Colombo, Major General L B R Mark, Director General, Disaster Management Centre, Colombo, Mr S Arambepola, Deputy Executive Director, Asian Disaster Preparedness and Dr Nisha Arunatilake, Research Fellow, Institute of Policy Studies, Colombo for their contributions on potentials in strengthening policies and researches.

We thank Ms Kushani De Silva, University of Huddersfield, UK for her abstract contribution and being the overall coordinator this workshop together with Dr Dharshi Thoradeniya, SPARC, University of Colombo, at a national scale.

We must thank all those who supported by various means for bringing academic perspectives of a decade of recovery efforts after Tsunami 2004 into Policy and Research efforts.

Professor Siri Hettige  
*Senior Professor of Sociology, University of Colombo, Sri Lanka*



# Workshop organisation

## Organised by

Social Policy Analysis and Research Centre (SPARC), University of Colombo, Sri Lanka  
Global Disaster Resilience Centre, University of Huddersfield, United Kingdom  
Department of Civil Engineering, University of Moratuwa, Sri Lanka

## Partners

Academic Network for Disaster Resilience to Optimise educational Development (ANDROID)  
Disaster Resilience Network  
Collaborative Action towards Societal Challenges through Awareness, Development, and Education (CASCADE) Project  
International Journal of Disaster Resilience in the Built Environment, Emerald Publishing

## Organising committee

Professor Siri Hettige, Senior Professor of Sociology, University of Colombo, Sri Lanka  
Professor Dilanthi Amaratunga, Co-Director, Global Disaster Resilience Centre, University of Huddersfield, United Kingdom  
Professor Richard Haigh, Co-Director, Global Disaster Resilience Centre, University of Huddersfield, United Kingdom  
Professor S S L Hettiarachchi, Senior Professor of Civil Engineering, University of Moratuwa, Sri Lanka  
Dr Kaushal Keraminiyage, Global Disaster Resilience Centre, University of Huddersfield, United Kingdom  
Ms Kushani De Silva, University of Huddersfield, United Kingdom  
Dr Dharshi Thoradeniya, SPARC, University of Colombo, Sri Lanka

## Social Policy Analysis and Research Centre (SPARC), University of Colombo, Sri Lanka

Social Policy Analysis and Research Centre (SPARC) of the Faculty of Arts, University of Colombo, provides a focal point within the Sri Lankan University system to integrate research, teaching, training, policy analysis and advocacy on critical areas of social and economic development. The Centre facilitates close collaboration between the academics and institutions outside the University system, including governmental as well as non-governmental agencies that deal with issues related to social policy.

The establishment of SPARC in 2005 culminated a process that was set in motion at the Colombo University with the launching of the “Improving Capacities for Poverty and Social Policy research’ (IMCAP) in late 2000, a staff and student development programme to strengthen skills of younger academics from different social science backgrounds on poverty and social policy analysis and research. The Centre builds on IMCAP’s achievements, but broaden its activities and contributions to the University. The Centre coordinates teaching, training and research on social development and provides accessible, comprehensive empirical data to formulate evidence based social policy recommendations and programmes to support social integration processes in Sri Lanka.

The Centre conducts research in a number of focal areas:

- Socio-Economic Security, Gender Equity and Social Integration of Youth
- Community Based Poverty Monitoring, Social Impact Assessment and Conflict Sensitive Development Planning
- Local Governance, Development and Civic Participation

These focal areas are reviewed from time to time in keeping with new experiences gained and emerging critical issues of the country.

## Global Disaster Resilience Centre, University of Huddersfield, UK

*A leader in inter-disciplinary research, education and advocacy to improve the resilience of nations and communities*

What would it be like to live in a world in which government authorities, businesses, communities and individuals work together to create a society that is able to withstand the effects of unforeseen events and threats? At the Global Disaster Resilience Centre we are working with stakeholders at the global, national, municipal and local level to make this happen.

The Global Disaster Resilience Centre is committed to excellence in research, education and advocacy to improve the resilience of nations and communities to disasters.

With growing population and infrastructures, the world's exposure to hazards is increasing. When disaster strikes, communities may need to be rebuilt physically economically and socially. At the same time, it is vital that any reconstruction activity pro-actively considers how to protect people and their environment, and reduce a community's vulnerability.

The Global Centre for Disaster Resilience is part of the School of Art, Design and Architecture at the University of Huddersfield in the UK. In November 2013, the University of Huddersfield was awarded the Times Higher Education University of the Year. The University excels in enterprise and innovation and in 2012, was named the Times Higher Education Entrepreneurial University of the Year.

### *Research themes*

- Disaster resilience
- Understanding disaster risk
- Contingency planning and resource management
- Private sector engagement in the development of disaster resilience
- Public private partnerships in disaster risk reduction
- Capacity building for disaster mitigation and reconstruction
- Risk management and sustainability
- Post-conflict reconstruction
- Social impact of reconstruction
- Public policy, governance & procurement
- Improved disaster resilience through social media interaction
- Community maturity for improved disaster resilience

### *International activities*

The Centre contributes to national and international committees to advise and guide on strategic and technical issues pertaining to disaster management. The Centre also provides leadership in actively helping to determine the research direction of the field, with a major International journal, periodic conferences and events, and frequent publication of cutting edge research in refereed journals, which are acclaimed nationally and internationally.

### *Recent projects*

The Centre's members are very experienced in obtaining European research councils funding. They lead and contribute to major collaborative international research projects that involve partners across the globe. Some examples include:

- *ANDROID (Academic Network for Disaster Resilience to Optimise educational Development) – a partnership with 67 international partners*
- *CASCADE (Collaborative Action towards Societal Challenges through Awareness, Development and Education) – an international partnership with 17 partners*

The Centre is keen to develop future projects that address societal challenges and international cooperation, inclusive, innovative and secure societies, support for bilateral, multilateral and bi-

regional policy dialogue, and networking and twinning activities to facilitate partnering and competence building.

### *PhD programme*

The Centre's PhD programme lays the foundations of inquiry that are relevant to disaster management. Researchers benefit from its strong research culture and there are strategies in place to ensure PhD research is of the highest quality and can achieve sustained growth. The Centre has defined principles that are applied throughout its work.

Protocols are designed to ensure researchers have sufficient time, authority and responsibility to conduct and develop their activities. This mechanism is also designed to maximise the opportunity to invest in and nurture researchers under the mentoring of senior researchers.

### *International Journal of Disaster Resilience in the Built Environment*

ISSN: 1759-5908

Editors: Professor Richard Haigh and Professor Dilanthi Amaratunga

Frequency: 4 issues per year

Indexed in Scopus

Website: [www.emeraldinsight.com/ijdrbe](http://www.emeraldinsight.com/ijdrbe)

The journal aims to further knowledge and understanding of the link between the built environment and disaster mitigation, response and reconstruction. The journal seeks to:

- Develop the skills and knowledge of the built environment research community and professions working in disaster prone areas, so that they may strengthen their capacity in strategic and practical aspects of disaster prevention, mitigation, response and reconstruction
- Provide a unique forum for novel enquiries into the development and application of new and emerging practices as a source of innovation to challenge current practices
- Promote the exchange of ideas between researchers, educators, practitioners and policy makers
- Influence disaster prevention, mitigation, response and reconstruction policies and practices

### *International conferences*

The Centre organises interdisciplinary conferences and seminars that promote innovation and knowledge exchange on disaster resilience between Higher Education and relevant stakeholders. Members of the Centre established the International Conference on Building Resilience Series in 2008. Most recently, the 4th International Conference on Building Resilience was held from 8th - 11th September 2014, at MediaCityUK, Salford, in the United Kingdom ([www.buildresilience.org/2014](http://www.buildresilience.org/2014)).

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*For more information about our research, teaching and advocacy, please contact:*

Professor Dilanthi Amaratunga and Professor Richard Haigh

Global Disaster Resilience Centre

University of Huddersfield

Queensgate, Huddersfield

HD1 3DH

United Kingdom

W. [www.hud.ac.uk/gdrc](http://www.hud.ac.uk/gdrc)

T. +44 (0)1484 471387

E. [d.amaratunga@hud.ac.uk](mailto:d.amaratunga@hud.ac.uk) / [r.haigh@hud.ac.uk](mailto:r.haigh@hud.ac.uk)



## Department of Civil Engineering, University of Moratuwa, Sri Lanka

The University of Moratuwa (UoM), which is the only Technological University in Sri Lanka, is located at the heart of a beautiful, vibrant and geographically well-connected city. They pride themselves in having an excellent Engineering Faculty and being the only University in Sri Lanka to have Faculties of Architecture and Information Technology. The University primarily caters to local students. While there are opportunities for overseas students to pursue undergraduate courses of study, we especially welcome graduate students from overseas for our postgraduate degree courses and research programs.

The vision of UoM is “to be the institution of academic excellence in Sri Lanka for technological disciplines with national relevance and international recognition”. Within this vision, our focus is to produce world class graduates at the UoM. Hence, the aim of the University is to produce academically sound, self confident, flexible and internationally recognized quality graduates who are able to hit the ground running from day one, and who can realise their true potential studying together and thereafter working together as professionals in Sri Lanka.

At the UoM, you will be part of a wonderful fraternity of talented youth, from all walks of life, diverse ethnicities and backgrounds, who are the best young minds in our country. While your stay at the University will be academically challenging, you will have a truly rewarding experience with numerous opportunities for social, cultural and sports activities within a stimulating and supportive environment to learn.

University of Moratuwa is ranked as the best university in Sri Lanka. We have been able to attract over 95% of the top-performers in the island-wide advanced-level examination. The University has three faculties: Architecture, Engineering, and Information Technology. Engineering Faculty is the largest. Engineering Faculty has nine departments: Chemical and Process Engineering, Civil Engineering, Computer Science and Engineering, Earth Resources Engineering, Electrical Engineering, Electronic and Telecommunication Engineering, Management of Technology, Materials Engineering, Mechanical Engineering, and Textile and Clothing Technology. We offer bachelors', masters, and doctoral degrees. The Department of Civil Engineering is the largest department in the Engineering Faculty and its flagship programme is the BSc Engineering Degree Programme. The department pioneered post graduate education in Sri Lanka and currently conducts a portfolio of courses covering different disciplines of engineering. The staff exceeding forty are heavily engaged in research and have contributed to major national development projects. The department has also established strong international links with academic and research institutions leading to productive collaborative activities. University of Moratuwa is a research-intensive university. They try to achieve research excellence by conducting graduate programs, funding faculty members for research, encouraging undergraduate students to select research-intensive projects, and through the ERU. ERU facilitates research dissemination. We conduct monthly research dissemination seminars, hold the annual ERU symposium, and publish the proceedings of the annual research symposium.

University of Moratuwa played a key role during the aftermath of 2004 Indian Ocean Tsunami and was instrumental in setting up the International Institute for Infrastructure Renewal and Reconstruction (IIIRR), a multi-university international consortium which provides overall leadership in research, education, planning, design and implementation for mitigation of the impact of natural disasters and infrastructure renewal and reconstruction projects in tsunami affected or underdeveloped regions.

## Tsunami recovery in Sri Lanka: ten years on

The Indian Ocean Tsunami after Tsunami provides a context where issues of resilience and vulnerability can be examined in terms of real life experience of diverse population groups and communities. Based on recent field work in the two most affected regions in Sri Lanka, an attempt is made to examine how diverse population groups, displaced by the disaster have coped with the effects of the disaster over the last ten years.

As is evident, most of the re-settlers have gone through a similar settlement process: temporary accommodation, temporary shelters and permanent housing. Some people have gone back to their former habitats for diverse reasons.

As one would expect, most people who were displaced are already resettled, either in new settlements away from the coast or in the same settlement where they were living before the disaster. The latter constitute a minority. Most of the new settlements have been built either with the financial support or the direct involvement of numerous non-governmental organizations; state agencies have facilitated the process, often by allocating land for building purposes and providing infrastructure facilities such as electricity, water and access roads.

Newly established Tsunami settlements are diverse in term of a range of criteria such as:

- a. Nature of settlement planning
- b. Type and quality of dwelling units
- c. Access to social infrastructure
- d. Access to livelihoods
- e. The nature of community formation
- f. Sense of security felt by community members
- g. Overall satisfaction with the life in the new settlement
- h. Integration of the community within the local institutional context.
- i. The level of maintenance of the physical and social infrastructure.
- j. Integration with host communities.
- k. Disaster Risk Reduction (DDR)
- l. New and persisting vulnerabilities
- m. Availability of various professional services for vulnerable groups such as the elders, children and mentally ill.

What are listed above are the key aspects of a comprehensive disaster mitigation programme. The extent of success or failure of an intervention programme can be effectively measured in terms of all of the above aspects. In this presentation, an attempt is made to offer an assessment of the impact of various external interventions following the 2004 Indian Ocean Tsunami in Sri Lanka. In short, the question addressed here is: what is the present state of affairs at a community level after ten years since the mass displacement of inhabitants in coastal communities by the largest natural disaster in the region in recent years?

As is well known, international humanitarian response to the disaster was unprecedented. Hundreds of non-governmental organizations and thousands of volunteers moved into the country offering diverse forms of assistance. Combined with the contribution of local organizations and people, such external support helped Sri Lanka to resettle most of the survivors within a few years. While the government declared a buffer zone precluding resettlement of the displaced too close to the sea, the inhabitants falling within the limits of the buffer zone were resettled in new settlements established in the surrounding areas, some as far as ten kilometers from the coast. Since then the buffer zone policy has been revised to accommodate different local demands.

Once the people affected by the Tsunami were resettled, most of the non-government organizations involved moved out, expecting local communities and local institutions to take over the responsibility of managing local affairs. There are some exceptions where the sponsoring

agency did not leave but continued to manage the affairs of the community with the involvement of community members.

In order to make a qualitative assessment of the ground situation after ten years, we have done field observations and interviews with community members and key informants in a number of settlements in eastern and southern Sri Lanka, in the districts of Galle, Batticaloa and Ampara (See Table 1).

Table 1: Communities Surveyed in the Eastern and Southern Provinces

<i>Eastern Province</i>	<i>Southern Province</i>
1. Navaladi	1. Galagodawatta
2. Tiraimadu	2. Unawatuna
3. Sainthamaruthu	3. Kosgoda
4. Mandanai	4. Piyadigama
	5. Kurunduwatta

While the fieldwork done during the course of present study is limited, we have nevertheless been able to gather considerable evidence to draw significant conclusions regarding the recovery process. In the remainder of the presentation, an attempt is made to make observations on a number of important issues. These pertain the following:

- a. Settlement planning
- b. Process and quality of construction
- c. Maintenance of infrastructure
- d. Social infrastructure provision
- e. Livelihoods
- f. Community formation and institutional context
- g. Management of local affairs
- h. Equity issues

#### a) Settlement Planning

Resettlement of thousands of families displaced by the Tsunami has been a major challenge for the government as well as non government organizations. Nevertheless, most of the affected people have been resettled within several years.

#### b) Housing

The usual method adopted by state and non government organizations has been employ to private construction contractors .Though some NGO's had kept a close eye at the work done by contractors, most had relied on the good will and integrity of contractors. In many cases, quality of construction has been much to be desired. People who are living in poorly constructed dwelling units that are already crumbling continue to suffer .Contractors have used poor quality construction material resulting in rapid deterioration of metal, masonry and timber work. While those who had the means have already repaired the damages, others with no resources continue to suffer .What should be noted here is that some of the problems are structural and cannot be attended to by inhabitants. This is particularly so in multi-story buildings. Leaking roofs, noise, seepage from toilets, flooding, etc are some of the pressing problems that residents have not been able to solve. As a result settlers continue to suffer, though some have left the settlement after selling or renting out their dwelling units.

#### c) Maintenance of physical and social infrastructure

Many settlers have made an effort to improve their dwelling units over the years. Only the poor have not been able to do so. On the other hand, physical and social infrastructure facilities such as roads, drains, community halls, play grounds, children's parks, etc. have become the responsibility

of community associations or local government institutions. In most settlements, such infrastructure remains badly neglected leading to rapid deterioration. In fact, some of the common facilities are already abandoned and fallen into disuse.

As mentioned before, the non-governmental organizations that sponsored most of the new settlements have moved out once the displaced families were resettled, but in most cases, no central or local government institutions have taken full responsibility for the management of community infrastructure. Moreover, community based organizations are either too weak or non-existent in most settlements and therefore, have not filled the void left by the sponsoring organizations.

Many organizations that sponsored new settlements for Tsunami victims had included various social infrastructure facilities in the settlement plan. Such infrastructure has often included sports facilities, multi-purpose community buildings, medical centers, and children's parks. In most settlements, such facilities have not been maintained and fallen into disuse over time.

#### d) Livelihoods

As is well known, many people living along the coast devastated by the Tsunami relied on livelihoods related to such activities as fishing and tourism. When most of them were displaced and resettled away from the coast, they lost their sources of livelihood. This was particularly true for those whose new settlements are located several miles away from the coast. Resettles have responded to livelihood problems in diverse ways. While some have given up earlier economic activities and found new sources of livelihood, others continue to engage in the same activities from the new location. The settlers travel to coastal areas by using various transport modes though this means spending more time and money. Some families have moved back to their old habitats in order to engage in their traditional livelihood activities.

#### e) Community formation and Institutional context

Most of the displaced families had come from diverse socio-economic backgrounds and different communities. When they are brought together into a single settlement where they are compelled to share the same space and facilities, certain issues are bound to rise. The formation of community based organizations had often been considered by external donors and some community oriented residents as a way to facilitate community mobilization around common needs. Yet in most settlements, such efforts have not resulted in the formation of sustainable and active community organizations due to various reasons.

Newly established communities are often not well integrated into the wider institutional context. For instance, local government institutions and central government agencies in the area often do not play a significant role in addressing infrastructure issues that have arisen in new settlements. Settlers continue to suffer due to unresolved issues but remain helpless.

#### f) Management of local affairs

The weak wider institutional set up around new settlements has led to a neglect of local issues. Weak community based organizations and various divisions within new settlements have not helped either. Some of the public order issues such as thefts, sense of insecurity, drug and alcohol abuse, intra-community disputes and vandalism affect the quality of life of many settlers but law enforcement agencies often have not come forward to address such issues. Similarly, unresolved land disputes continue create problems for many settlers, often leading to heated arguments and verbal abuse, threatening peaceful co-existence among families involved. No authorities have intervened to resolve these issues and many people do not see an end to such lingering disputes.

#### g) Equality issues

As mentioned before, the Indian Ocean Tsunami devastated whole communities in many areas, destroying property and lives of many in these communities. While new settlements were built to accommodate those who were living in villages that fell within the newly declared buffer zone, other were compensated depending on the extent of damage caused to their houses and productive assets. In the new settlements, each displaced family was given a dwelling unit. While the size of the dwelling unit has been broadly uniform; some inequities have arisen due to various

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factors such as the quality of construction and different modes of operation and varying standards adopted by sponsoring agencies. In some cases, within the same settlement, different types of housing units have been constructed i.e. multi-story apartments vs. individual housing units on separate plots of land. Moreover, the size of land pots has varied widely, some just enough for the house, while others have ample home garden space. Some settlements are provided with many common amenities while others comprise housing units only. These and other variations have given rise to significant inequities both within and across settlements. It is difficult to see how these issues could be addressed today as it is difficult to imagine how such inequities can be reduced today.

## ANDROID (Academic Network for Disaster Resilience to Optimise educational Development)



This workshop is being organised in association with ANDROID (Academic Network for Disaster Resilience to Optimise educational Development), an Erasmus academic network that aims to promote co-operation and innovation among European HE to increase society's resilience to disasters of human and natural origin. The network has sixty-seven representatives from thirty-one countries, twenty-eight in the EU, as well as organisations from Australia, Canada and Sri Lanka. The network's teaching and research is concerned with what resilience is, what it means to society, and how societies might achieve greater resilience in the face of increasing threats from natural and human induced hazards.

In order to achieve this aim, ANDROID: 1) Promotes discourse among European applied, human, social and natural scientists to, pool their results and findings, discuss methods and develop interdisciplinary explanations that increase society's resilience to disasters; 2) Describes, analyses, and compares the capacity of European cities and HE to address disaster risk, and thereby reinforce the link between education and society; 3) Builds the capacity of HE to address emerging challenges in disaster resilience, strengthen the link between research and teaching, and inform policy development.

- The *ANDROID virtual network* forms a virtual hub for the project. Using Joomla, a free and open source content management platform, the virtual network provides a broad range of functionality that facilitates administration and coordination across partner institutions: collaboration and communication tools; information handling and exchange; project management tools; data collection tools; and, intra-network dissemination.
- The *Doctoral School* is a fully coordinated, innovative, and international interdisciplinary doctoral teaching and research programme focused on the most salient issues and features shaping society's ability to tackle the challenges posed by natural and human induced hazards. The Doctoral School provides complementary and innovative research training programmes aimed at honing the students' skill set, and draws on the wide disciplinary base of the network's partners to promote inter-disciplinary working for doctoral students.
- A *pan-European survey* has identified, collated and disseminated good practices for inter-disciplinary working in research and teaching that explores what resilience is, what it means to society, and how societies might achieve greater resilience in the face of increasing threats from natural and human induced hazards.
- The *inventory of European disaster resilience education* describes, analyses, and compares disaster resilience related education programmes in order to establish existing capacity among European HEIs to address the threat posed by hazards of natural and human origin.
- A survey assesses the *capacity of local government's public administrators* in European urban areas to address disaster risk.
- The network's *Special Interest Groups (SIGs)*, which represent the particular research and teaching concerns of groups of members, defines a scope and work plan, organises seminars, contributes to the network newsletter, and communicates regularly through the Virtual Network. Each SIG has contributed to a report on future research directions in disaster resilience research, and the implications for education.
- An *Open Educational Resources (OER) platform* hosts digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research.
- A *series of annual conferences* across Europe brings together Network members, lecturers and researchers in universities and other higher education institutions with an interest in disaster resilience, as well as those in NGOs and policy fields.

## Book of Abstracts

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### Contact the Secretariat

Principal investigator: Professor Richard Haigh

E-mail: [android@disaster-resilience.net](mailto:android@disaster-resilience.net)

Website: [www.disaster-resilience.net](http://www.disaster-resilience.net)

## CASCADE (Collaborative Action towards Societal Challenges through Awareness, Development, and Education)



Cascade



CAPACITIES



European Union

Highlighted by the European Commission report (2012) on 'Enhancing and focusing EU international cooperation in research and innovation', global challenges are important drivers for research and innovation. Thus, the EU needs to strengthen its dialogues with international partners to build critical mass for tackling these challenges. However, critical mass is lacking in many cases and the strategy driving the development of the actions is not always clear. This was one of the conclusions of the FP7 interim evaluation, which stated that there needs to be an 'intensification of international cooperation' activities focused on 'engaging with partners outside of Europe on equal terms and in programmes and activities of high mutual interest'. The same report recommended the 'coherent strategic development' of the Union's policy for international cooperation in research and innovation. Therefore, this action will, overall, aim to achieve the main objectives of the European Commission (2012) for International cooperation in research and innovation:

1. Strengthening the Union's excellence and attractiveness in research and innovation as well as its economic and industrial competitiveness by creating win-win situations and cooperating on the basis of mutual benefit; by accessing external sources of knowledge; by facilitating access to new and emerging markets; and by agreeing on common practices for conducting research and exploiting the results;
2. Tackling global societal challenges by developing and deploying effective solutions more rapidly and by optimising the use of research infrastructures;
3. Supporting the EU's external policies through international cooperation in research and innovation as an instrument of soft power and a mechanism for improving relations with key countries and regions.

In this context, the *overall objective* of CASCADE (Collaborative Action towards Societal Challenges through Awareness, Development, and Education) is to prepare ground for a future research programme that targets South Asian Countries and promotes bi-regional coordination of Science & Technology (S&T) cooperation, including priority setting and definition of S&T cooperation policies.

*The specific objectives of CASCADE* are to: compile a regional position paper that identifies global challenges and research priorities; map and develop an inventory of national and regional stakeholders related to global challenges; and, raise awareness on research & innovation priorities for fostering cooperation and towards building mutual understanding on how to address common global societal challenges. CASCADE targets and has the participation of all South Asian countries specified in the call: Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka.

### Objectives of the project

- 1) Identify societal challenges on which to focus the cooperation and justify them in terms of common interest and mutual benefit relevant to the targeted countries in Southern Asia. In this context, following broad Horizon 2020 - The Framework Programme for Research and Innovation will be considered:
  - a) Health, demographic change and wellbeing;
  - b) Food security, sustainable agriculture, marine and maritime research and the bio-economy;
  - c) Secure, clean and efficient energy;



- d) Smart, green and integrated transport;
  - e) Climate action, resource efficiency and raw materials;
  - f) Inclusive, innovative and secure societies
- 2) Provide up to date analytical evidence on key stakeholders and their competences in Southern Asia
- 3) Support, where relevant, the training and extension of the network of FP Contacts in the region, in particular with the view of increasing awareness about cooperation opportunities offered by Horizon 2020

### S&T objectives and measurable outputs

The overall objective of CASCADE is to prepare ground for a future INCONET programme that targets South Asian Countries and promotes bi-regional coordination of S&T cooperation, including priority setting and definition of S&T cooperation policies.

The specific objectives of CASCADE are to: compile a regional position paper that identifies global challenges and research priorities; map and develop an inventory of national and regional stakeholders related to global challenges; and, raise awareness on research & innovation priorities for fostering cooperation and towards building mutual understanding on how to address common global societal challenges. CASCADE targets and has the participation of all South Asian countries specified in the call: Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka.

The objectives are linked to an interacting set of work packages and measurable / verifiable outputs. In addition to the 3 RTD work packages (WP2 – Identify global challenges relevant to Southern Asia; WP3 – Identify and map stakeholders in Southern Asia; WP4 – Raise awareness of Horizon 2020 and related schemes) and there are 2 further work packages dealing with project management (WP1) and dissemination and exploitation (WP5).

### Participants

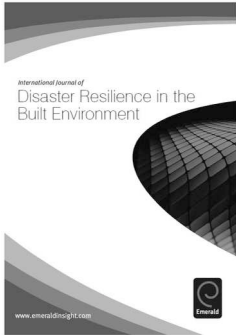
University of Salford (USAL)	UK
University of Huddersfield (HUD)	UK
University of Central Lancashire (UCLAN)	UK
Tallinn University of Technology (TUT)	Estonia
Vilnius Gediminas Technical University (VGTU)	Lithuania
University of Bologna (UNIBO)	Italy
Fondation pour la recherche stratégique (FRS)	France
Nangarhar University (NU)	Afghanistan
Patuakhali Science and Technology University (PSTU)	Bangladesh
Royal Institute of Management (RIM)	Bhutan
Institute of Engineering, Tribhuvan University (IOE)	Nepal
Volunteers for Development Nepal (VFD)	Nepal
University of Peshawar (UoP)	Pakistan
<i>Local Councils Association of the Punjab (LCAP)</i>	<i>Pakistan</i>
University of Moratuwa	Sri Lanka
Federation of Sri Lankan Local Govt. Authorities (FSLLA)	Sri Lanka
Asian Disaster Preparedness Center (ADPC)	Thailand (presence in all targeted countries)
ECO CARE (ECO)	Maldives

For further information:

Principal Investigator: Professor Dilanthi Amaratunga (d.amaratunga@hud.ac.uk)

Website: [www.cascade-inconet.eu](http://www.cascade-inconet.eu)

International Journal of Disaster Resilience in the Built Environment  
(IJDRBE)  
ISSN: 1759-5908



*Editors:*

*Professor Dilanthi Amaratunga & Professor Richard Haigh  
Global Disaster Resilience Centre, University of Huddersfield, UK*

This is the only journal in the field to promote research and scholarly activity that examines the role of building and construction to anticipate and respond to disasters that damage or destroy the built environment. Although the origins and causes of disasters are varied, the consequences to human society are frequently similar: extensive loss of life, particularly among vulnerable members of a community; economic losses, hindering development goals; destruction of the built and natural environment, increasing vulnerability; and, widespread disruption to local institutions and livelihoods, disempowering the local community. In particular, it aims at developing the skills and knowledge of the built environment professions and will strengthen their capacity in strategic and practical aspects of disaster prevention, mitigation, response and reconstruction to mitigate the effects of disasters nationally and internationally. The journal publishes original and refereed material that contributes to the advancement of the research and practice, and provides contributing authors with an opportunity to disseminate their research and experience to a broad audience.

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Professor Dilanthi Amaratunga (email: [d.amaratunga@hud.ac.uk](mailto:d.amaratunga@hud.ac.uk))

Professor Richard Haigh (email: [r.haigh@hud.ac.uk](mailto:r.haigh@hud.ac.uk))

Global Disaster Resilience Centre, University of Huddersfield, UK

Journal web page: [www.emeraldinsight.com/ijdrbe.htm](http://www.emeraldinsight.com/ijdrbe.htm)



## Contributors

*Siri Hettige* is the Senior Professor of Sociology, Department of Sociology at the University of Colombo, Sri Lanka. He is also the Chairman, Social Science Research Committee, National Science Foundation, Sri Lanka since 2004, and former Director of the Social Policy Analysis and Research Centre, Faculty of Arts, University of Colombo. The Social Policy Analysis and Research Centre (SPARC), University of Colombo provides a focal point within the Sri Lankan University system to integrate research, teaching, training, policy analysis and advocacy on critical areas of social and economic development. The centre facilitates close collaboration between academics and institutions outside of the University system, including governmental as well as non-governmental agencies that are dealing with issues related to social policy. He was also the Dean, Faculty of Arts, University of Colombo 1999-2002, and Head, Department of Sociology 1987 – 1988, 1995-1999. He is an Adjunct Professor at RMIT University, Melbourne and an Adjunct Research Associate at CEPUR, Monash University, Australia. His research interests include migration, poverty, education, youth and identity and politics, inequality, governance and development, community studies. His Key Scholarships, Fellowships and Grants: Monash Graduate Scholarship, Monash University, Australia; British Academy Fellow; Fulbright Senior Scholar, University of Pennsylvania, USA; Advisor to ILO on National Migration Policy in Sri Lanka; Principal Fellow, School of Philosophy, Geography and Anthropology, University of Melbourne, Australia. He has published widely in the areas of Youth, Peace and Sustainable Development and is widely recognized as one of the prominent academics leading research in areas of poverty, conflicts and Youth studies. His publications include : Youth and Social Transformation: Improving life chances of youth in Sri Lanka (2014); Governance, Conflict and Development in South Asia, Delhi; Sage Publications, co-edited with Eva Gerhard, University of Bielefeld, Germany; Tsunami Recovery in Sri Lanka: Retrospect and Prospect , Colombo: SPARC and Action-aid International (2007); Measuring Vulnerability at Local Level in Birkmann, J. (ed.) Measuring Vulnerability to Natural Hazards, Tokyo: United Nations University Press.

*S S L Hettiarachchi* is Professor of Civil Engineering at the University of Moratuwa, Sri Lanka. He specialized in Coastal Engineering and obtained his PhD from Imperial College, London. He has represented Sri Lanka on the establishment of the Indian Ocean Tsunami Warning System (IOTWS), under UNESCO/IOC, Paris since its inception in 2005 and is serving as Chairman of Working Group on Risk Assessment for Indian Ocean States for the Inter Governmental Coordination Group for the establishment of the IOTWS (UNESCO/IOC/ICG/IOTWS). As Chairman, Professor Hettiarachchi provided leadership for the preparation of Tsunami Risk Assessment Guidelines for the Indian Ocean (UNESCO/IOC Guideline and Manual No 52). He has also contributed to other UNESCO guidelines on coastal hazards. The Working Group also collaborated with Geo Science Australia to develop the Tsunami Hazard Map for the Indian Ocean. These two powerful tools will contribute to the safety of human life, ecosystems and infrastructure against the tsunami hazard within a multiple hazard coastal framework. Professor Hettiarachchi has also worked with UNDP –Asia Pacific Regional Centre-Bangkok in providing training in Tsunami Risk Assessment for Indian Ocean States.

*Dilanthi Amaratunga* is the Professor of Disaster Management at the School of Art, Design and Architecture at the University of Huddersfield, UK where she leads the Huddersfield Centre for Disaster Resilience. Dilanthi's research interests include post disaster reconstruction, conflict mitigation, gender and projection, capability and capacity building in managing disasters, empowerment of women, and women in construction. An interdisciplinary background in Quantity Surveying, Facilities and Business Continuity Management, Education and Training, Gender and Disasters and Disaster Mitigation and Reconstruction provides her the opportunities to work across a broader construction and disaster management research agenda including developing partnerships of international research teams, government, NGOs and communities. She is the Co-Editor of International Journal of Disaster Resilience in the Built Environment, the only journal to promote research and scholarly activity that examines the role of building and construction to anticipate and respond to unexpected events that damage or destroy the built environment. She

has secured a number of significant, high profile grants including EC FP7 funded CASCADE (Collaborative Action towards Societal Challenges through Awareness, Development, and Education) with 17 international partners. CASCADE will identify societal challenges on which to focus the cooperation and justify them in terms of common interest and mutual benefit relevant to the targeted countries in Southern Asia within the context of Horizon 2020 societal challenges. In January 2014, she was invited by the European Commission to formally launch their Horizon 2020: the new EU Framework Programme for Research and Innovation in South Asia. She has presented widely at international conferences, has led international disaster management workshops and seminars, and is working actively with the United Nations. To date she has produced over two hundred publications, refereed papers and reports, and has made over 50 key note speeches in around 30 countries. The strengths she has brought to these activities are critical scholarship and leadership. Full details of Dilanthi's publications, projects, and national and international activities can be found at [www.dilanthiamaratunga.net](http://www.dilanthiamaratunga.net).

*Richard Haigh* is a Professor and Co-Director of the Huddersfield Centre for Disaster Resilience at the University of Huddersfield, Joint Editor of the International Journal of Disaster Resilience in the Built Environment, and Co-Chair of the International Conference on Building Resilience series. He was formerly Acting Associate Head of the Research and a Research Professor at the School of the Built Environment, University of Salford. His research interests include the conceptual understanding of resilience, the reintegration and rehabilitation of conflict-affected communities in Sri Lanka, and engagement of the private sector in the development of societal resilience. Richard is Principal Investigator of ANDROID (Academic Network for Disaster Resilience to Optimise Educational Development), a partnership of 67 institutions across 31 countries committed to promote co-operation and innovation to increase society's resilience to disasters of human and natural origin. Richard was also Principal Investigator of Conflict Prevention through Infrastructure Reconstruction, a 12-month intervention to enhance the capacity of local stakeholders to deliver conflict sensitive infrastructure reconstruction programmes within the North and East of Sri Lanka, and thereby to help prevent future conflict in the region. The project was funded by the UK Foreign and Commonwealth Office through the British High Commission in Colombo. Richard has published over 25 peer reviewed journal articles, 1 edited book, 7 book chapters, and 13 reports for a variety of stakeholders. A full list of Richard's publications, projects, and national and international activities can be found at [www.richardhaigh.info](http://www.richardhaigh.info).

*Ranjith Senaratne* is Vice Chairman, University Grants Commission, Sri Lanka and Senior Professor of Crop Science, University of Ruhuna. Professor Senaratne read for his B.Sc in Agriculture and M.Phil in Agricultural Biology at the University of Peradeniya, Sri Lanka from 1973 - 1980. Having joined the University of Ruhuna in 1981, he carried out his doctoral studies at the Agricultural University in Vienna, from 1982-1986, which dealt with quantifying the nitrogen carry-over effects of legumes in sequential cropping systems using nuclear techniques. Upon his return to Sri Lanka in 1986, he pursued research in the field of nutrient cycling in multiple cropping systems, nutrient dynamics in agro-forestry systems and restoration of degraded land. He has over 75 publications to his credit. In 1992, he was adjudged the most outstanding young scientist in Biology in Sri Lanka by the Third World Academy of Sciences in Rome, Italy. Prof. Senaratne has been the recipient of several internationally competitive and prestigious research grants including a grant from the Board on Science and Technology for International Development (BOSTID) of the National Research Council of the USA and has held a number of coveted fellowships including the Andre Mayer Fellowship of the FAO and the Marie Curie Fellowship of the European community. He was appointed the Professor of Crop Science of the University of Ruhuna in 1998 and he has served as the Dean of the Faculty of Agriculture, University of Ruhuna for a period of nearly eight years before being appointed the Vice Chancellor of the University of Ruhuna in March 2001. He has held the post of Vice-Chancellor for a period of six years from March 2001 to March 2007 with distinction. As the Vice Chancellor, he has been strongly committed to promoting academic excellence, high impact research, creative enterprise, strategic partnership with industry, community development and international cooperation. Under his visionary leadership and mature guidance, the University of Ruhuna has made great strides in the academic, research and

outreach sphere, emerging as a leader of higher education in Sri Lanka. Prof. Senaratne has been the President of the Agriculture & Forestry Section of the Sri Lanka Association for the Advancement of Science and the co-editor of "Tropical Agricultural Research and Extension" Journal. He has served as a member of a multitude of professional bodies and national committees in an advisory capacity and has also been a member of Consultative Committee of the International Water Management Institute and the Hambantota District Chamber of Commerce. He has been the Chairman of the Committee of Vice-Chancellors and Directors of the universities in Sri Lanka in 2006. In recognition of his outstanding contribution in education, science, community development and international cooperation, the University of Durham in the UK conferred an honorary Doctorate on him in 2007. He presently serves as the Chairman of the Ocean University (National Institute of Fisheries and Nautical Engineering) and as the Vice Chairman of the University Grants Commission.

*G Vickneswaran* is a Lecturer in Sociology and Anthropology at the Department of Social Sciences, Eastern University. He obtained his BA (Hons) Degree from Eastern University, Sri Lanka. He has also completed master degree in Conflict peace and Development Studies at the Tribhuvan University, Nepal. He has conducted research on post-war development, post disaster recovery, community development and Structural violence.

*K D N Weerasinghe* is a Professor at the Department of Agricultural Engineering in the Faculty of Agriculture at the University of Ruhuna. Professor Weerasinghe is Engineer Agronomist M.Sc., Ph.D. (Friendship, Moscow) and Consultant at the Asian Disaster Preparedness Centre.

*Kathirgamathamby Krishnaraj* is an assistant lecturer at the Department of Sociology, University of Colombo. He graduated in Sociology and Anthropology from Eastern University and has also completed a Master degree in Conflict peace and Development Studies at the Tribhuvan University, Nepal. His research interests revolve around post-war development, conflict management, peace studies, social change, socialization and relocation.

*Indu S Weerasoori* is a Chartered Town Planner with twenty five years of experience with the Urban Development Authority, where she was the Deputy Director General (Planning). Ms Weerasoori's experience includes preparation of development plans and working on town planning projects across Sri Lanka. She holds an M.Sc in Urban Development planning from University of London, Post graduate Diploma in Urban revitalization and Heritage Management from University of International housing Studies in Netherland and Bachelor of Development Studies from University of Sri Jayawardenepura. Planner Weerasoori joined UN-HABITAT in 2012 and she is the National Project Manager, Disaster Risk Reduction and has overseen the development of this unit and roll out of the resilient city Programme across the country. She is a Fellow Member and President Elect of the Institute of Town Planners Sri Lanka. Ms Weerasoori has been appointed as a member of the advisory committee of the Cities and Climate Change Initiative (CCCI), UN-HABITAT and she is also visiting lecturer of the University of Sri Jayawardenepura, University of Colombo and University of Moratuwa. She serves as a Faculty Member and External Examiner for the faculty of Architecture of the University of Moratuwa..

*Nishara Fernando* is a Senior Lecturer at the Department of Sociology, University of Colombo and the Acting Director of Social Policy Analysis and Research Center (SPARC) Faculty of Arts, University of Colombo. He holds a PhD in Social Geography from University of Bonn, Germany, M.Phil in Sociology from university of Colombo, Postgraduate Diploma in Sociology, La Trobe University, Australia and a BA in Sociology, University of Colombo. His specialization includes vulnerability assessments, voluntary and involuntary relocation, livelihoods analysis, poverty, youth and applied research methodology

*Kushani De Silva* is a visiting lecturer in Universities of Colombo and Peradeniya Universities on the subjects related to Disaster Management, Eco-systems Based Disaster Risk Reduction and Gender. She is a researcher attached to University of Moratuwa. Also a Consultant Programme Development & Management and she is a PhD candidate in Disaster Management with a special emphasis on Gender. Also she is a. She has also obtained Masters in Women's Studies with a special

focus on Gender perspectives in Disaster Risk Reduction (DRR) and Post Graduate Diploma in Women's Studies, BSc in Agriculture (Hons) with a special focus on environment and vulnerable communities . She has gained research experience in Agriculture, Disaster Risk Management and Gender and comprised with index journal, international and national publications. Before joining IUCN she worked with UNDP for 8 years in the areas of programme development and management in consultation with Ministries, Departments, UN agencies, Academic Institutions, INGOs/NGOs, media and Community Based Organizations (CBOs). While working with UNDP she worked as the Coordinator for the National Disaster Management Coordination Committee (NDMCC), Coordinator for developing Sri Lanka Comprehensive Disaster Management Programme (SLCDMP) 2014-2018 and Coordinator for developing first set of standard school books on disaster management in Sri Lanka

*Ananda Galappatti* is a medical anthropologist based in Sri Lanka. He is Director of Strategy at The Good Practice Group, a social business specialising in the field of mental health and psychosocial support (MHPSS). Ananda is also a visiting lecturer at the Faculty of Graduate Studies, University of Colombo, and a co-founder of the online platform mhps.net. He was technical advisor and coordinator of 'The Mangrove: Psychosocial Support and Coordination Network' for the post-tsunami MHPSS response in the Batticaloa District of Eastern Sri Lanka from Jan 2005 to June 2006. For more information, please see <http://about.me/anandalappatti>.



## Keynote Address



### Role of Higher education institutes in promoting DRR research and academic programmes via collaboration

*Professor Ranjith Senaratne, Vice Chairman, University Grants Commission, Sri Lanka and Senior Professor of Crop Science, University of Ruhuna, Sri Lanka*

Professor Senaratne read for his B.Sc in Agriculture and M.Phil in Agricultural Biology at the University of Peradeniya, Sri Lanka from 1973 - 1980. Having joined the University of Ruhuna in 1981, he carried out his doctoral studies at the Agricultural University in Vienna, from 1982-1986, which dealt with quantifying the nitrogen carry-over effects of legumes in sequential cropping systems using nuclear techniques. Upon his return to Sri Lanka in 1986, he pursued research in the field of nutrient cycling in multiple cropping systems, nutrient dynamics in agro-forestry systems and restoration of degraded land. He has over 75 publications to his credit. In 1992, he was adjudged the most outstanding young scientist in Biology in Sri Lanka by the Third World Academy of Sciences in Rome, Italy. Prof. Senaratne has been the recipient of several internationally competitive and prestigious research grants including a grant from the Board on Science and Technology for International Development (BOSTID) of the National Research Council of the USA and has held a number of coveted fellowships including the Andre Mayer Fellowship of the FAO and the Marie Curie Fellowship of the European community.

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Prof. Senaratne has been the President of the Agriculture & Forestry Section of the Sri Lanka Association for the Advancement of Science and the co-editor of "Tropical Agricultural Research and Extension" Journal. He has served as a member of a multitude of professional bodies and national committees in an advisory capacity and has also been a member of Consultative Committee of the International Water Management Institute and the Hambantota District Chamber of Commerce. He has been the Chairman of the Committee of Vice-Chancellors and Directors of the universities in Sri Lanka in 2006. In recognition of his outstanding contribution in education, science, community development and international cooperation, the University of Durham in the UK conferred an honorary Doctorate on him in 2007. He presently serves as the Chairman of the Ocean University (National Institute of Fisheries and Nautical Engineering) and as the Vice Chairman of the University Grants Commission.

## Tsunami Recovery in Sri Lanka: Ten Years On

# ABSTRACTS

## Book of Abstracts

## About the workshop

On the 26<sup>th</sup> of December 2004 a Tsunami wave triggered by an earthquake of magnitude 9.5 in the Richter scale off the coast of Sumatra in the Indian Ocean hit Northern, Eastern and Southern coastal regions of Sri Lanka causing 40,000 human deaths, 500,000 internally displaced people and US \$ 900 million worth of infrastructure and environmental damage. This is the biggest natural disaster in the country's recorded history. Assistance rushed in from local communities, government, private sector, non-governmental organizations and international communities. A Centre for National Operations (CNO) was formed under the President as an initial step to coordinate relief efforts that came in. By November 2005 all government agencies working on tsunami consolidated into a single agency called Reconstruction and Development Agency (RADA). This year marks the Tenth Anniversary of the Indian Ocean Tsunami (10T).

Recovery from the adverse effects of a major disaster usually takes many years. Some issues are likely to linger on over a long period of time. Many studies have been undertaken following the disaster to ascertain the nature and extent of recovery from the disaster in terms of resettlement, restoration of livelihoods, recovery from mental trauma, community building, etc.

It is in view of the above, the one day workshop is organized to commemorate the Tenth Anniversary of the Indian Oceanic Tsunami by the Social Policy Analysis and Research Centre (SPARC) Faculty of Arts University of Colombo in collaboration with Global Disaster Resilience Centre at the University of Huddersfield, UK and Department of Civil Engineering University of Moratuwa.

The purpose of the present workshop is to take stock of the Tsunami recovery process in Sri Lanka. The main question that we pose is: where do the victims of the Tsunami stand today after ten years of the event? We attempt to answer this question in the light of qualitative data collected from a sample of communities in the Eastern and Southern provinces of Sri Lanka.<sup>1</sup> We focus attention on a number of key areas. They are:

- Community Formation and Social Cohesion
- Livelihood Restoration
- Social Infrastructure/Institutional Context
- Gender and Recovery
- Psychological Well-being
- Impact of Children, Elders and Disables
- Impact of Early Warning Mechanisms
- Impact of reconstruction

### Key areas

#### *Community formation and social cohesion*

Tsunami had not only damaged the physical/material aspect of life but had also destroyed the community in many different ways. With the re-location of the victims, earlier community formations were disturbed and re arranged in a different form. Ten years after tsunami it is timely to explore how well the communities have adapted, coped with or are still in tension with the new community formations. We will be specifically looking at how caste, class and ethnic structures, accessibility to welfare and religious beliefs were formed in the new community and how it impacted on social cohesion of the new community.

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<sup>1</sup> Communities selected for the survey are Batticaloa and Galle.

*Livelihood restoration*

With the demarcation of the buffer zone livelihoods of the fishing communities were disturbed due to lack of accessibility to the sea. We will explore how livelihoods have been restored and how people coped with the new situation. We will be specifically looking at whether the victims went back to their old livelihoods or switched to new livelihoods, were they sufficiently provided with equipment/resources and how did the authorities and victims themselves perceive social security.

*Social infrastructure/institutional context*

Dismantled social infrastructure is indeed a major hindrance to the restoration of the victims' lives. Victims cannot resume their normal lives without proper functioning of educational and health institutions and services such as transport and banking. Thus restoration of victims' lives and building of social infrastructure has to be done in tandem. We will be exploring the development of social infrastructure as a means of restoring the lives of the victims.

*Gender and recovery*

The ability to prepare for and protect from disasters can vary with different gender roles. Gender roles associated with cultural context influence women and men often having distinct roles, responsibilities, and differential access to a range of social, economic, and political resources at intra and inter household levels. Therefore it is important to explore gender perspectives in disaster recovery that can shape understanding sustainable recovery with gender-differentiated situations and the priorities they can give rise to. Contribution of men and women as members of communities most susceptible to hazards can and do play a vital role in strengthening disaster recovery efforts.

*Psychological well-being*

It is not only the physical infrastructure that needs to be put in place for the victims to resume their normal lives, but the trauma that they went through needs to be carefully addressed. By examining the institutional support (government, NGO and religious institutions) received by victims, we explore whether there is a gap that needs to be filled in between the services provided and the expectations of the victims.

*Impact on children, elders and disabled*

In general children, elders and the disabled are often dependents in the community due to several reasons. Lack of aid equipment and inaccessibility of technologies used by disabled individuals in a disaster made them dependent on the support of a care taker. Therefore recovery efforts focus on both the disabled and care takers. Helping such groups as well and assisting the disabled should be part of any disaster preparedness, mitigation and recovery plan/effort. Children under 5 years are main victims of sanitation-related illnesses because of less developed immunity and greater exposure to pathogens. Also children below 18 frequently become victims of trauma due to disasters. Interruption in health & education services due to disasters often disadvantage children compared to other vulnerable groups. Elderly individuals are especially susceptible to death and injury in disasters because of a number of factors including physical and cognitive disabilities, reliance on caregiver support to function, transportation needs and increased susceptibility to diseases and infection. Separation during displacement leaves older people further disadvantaged. Elderly individuals must be included in decisions and governing structures established at ground level ensuring their knowledge and experience are utilized while catering their recovery needs.

*Impact of early warning mechanisms*

Most of the disaster Sri Lanka experiences are weather related that can be predicted and monitored as hazards in advance. Precise generation of early warning alerts and timely dissemination are the key features of a functioning early warning system. Such a system can improve effectiveness of emergency response and save lives and property. Existing national systems to monitor regular hazards needs to be strengthened, upgraded and further integrated with the regional/global systems. Improved equipment, increased national coverage and training of staff in new techniques are critical elements of EW system that will enhance emergency preparedness capacity. Our research shall also focus attention on how the need for early warning has been addressed at a community level in the selected areas affected by Tsunami.

*Impact of reconstruction*

Reconstruction' is well defined as 'the action taken to re-establish a community after a period of rehabilitation subsequent to a disaster and these actions include the construction of permanent housing, a full restoration of all services, and complete resumption of pre-disaster state'. Thus, reconstruction does not stand only for reconstruction of physical stock. Accordingly, reconstruction after a natural disaster such as the 2004 Indian Ocean Tsunami should address all physical, social, economic, political, environmental sectors. However, this chapter uses the term 'reconstruction' to denote 'built-environment specific reconstruction', which is 'physical reconstruction of housing and infrastructure' in consequence of natural disasters. It analyses how this built-environment specific reconstruction could address the developmental needs in such a way to contribute to sustainable socio-economic development as its primary focus. There is also a need to identify the possible ways of linking reconstruction efforts to sustainable socio-economic development.

**Policy briefing**

The workshop participants will attempt to take stock of the Tsunami recovery process in Sri Lanka, considering where the victims of the Tsunami stand today, ten years after the event. The insights and conclusions that emerge from the event will be used to inform policy for the international community, as well as national and local government. In doing so, the workshop will help to ensure that there is positive action towards disaster risk reduction, and also advise future recovery policies and practices when communities face the aftermath of a major disaster.

## Social protection of elders in the disaster recovery process – some evidence from the Eastern Province of Sri Lanka

*K. Krishnaraj, Dept. of Sociology, University of Colombo, kkrajan2110@hotmail.com*

*G. Vickneswaran, Eastern University of Sri Lanka*

Elderly persons constitute a vulnerable group in many societies. Yet, elders also play a leadership role in certain social situations due to their knowledge and experience. While aging is inevitable, reputation of elders in communities is determined by certain factors, i.e. whether they are productive or non-productive and their level of dependency on family members. Disasters, causing severe social disorganization, make them more vulnerable in their own community.

This study is a descriptive analysis of the conditions of elders in post-Tsunami rehabilitation scenario. Overall focus of the study is social wellbeing of elders in Tsunami affected communities. And it specifically aims to identify the kind of attention paid to elders in Tsunami rehabilitation interventions, evaluate the effectiveness of social rehabilitation assistance in contributing to the wellbeing of elders and to analyze the situation with respect to social protection of elders from the socio-economic and cultural point of view in Tsunami affected communities.

This study is mostly based on qualitative data and to a lesser extent on quantitative data. The study was limited to selected Tsunami affected communities in Eastern Sri Lanka. The study found that no specific attention was given to elders in Tsunami rehabilitation activities. The continuity in traditional occupations, like fishing and agriculture, and ownership of tangible assets essential for economic activities and dwelling have helped reduce the level of their dependency on family members, despite their physical weakness. Changes in livelihood, marriage and religious life have reduced the traditional understanding of elders in communities in the post-Tsunami period. Loss of family members due to the disaster and loss of livelihood due to relocation and buffer zone demarcation led elders to be marginalized in many communities. Abandoned elderly persons are often addicted to alcohol and engage in theft and other deviant activities. However, in communities that strictly follow the religious practices and hold their traditional cultural values, amidst rapid changes in economic and social life, the position of elders as community leaders still persists in some communities and as a result, they still enjoy considerable social support both in family and community.

**Keywords:** displacement, elders, dependency, community leadership, vulnerability, social support



## Development of Indian Ocean Tsunami Warning System for human security

*Samantha Hettiarachchi, Senior Professor, University of Moratuwa, Chair Working Group on Risk Assessment Reduction of UNESCO/IOC/ICG/IOTWS, sampens1955@hotmail.com*

In the aftermath of the Indian Ocean Tsunami, the member states decided to establish a Indian Ocean Tsunami Warning System (IOTWS) under UNESCO/IOC, Paris which governs global tsunami warning systems under the United Nations. The IOTWS will function as a coordinated network of national systems and capacities where each member state has the responsibility of identifying the hazard, assessing the risk and issuing the warning to its population within their respective territories, assisted by Regional Tsunami Service Providers (RTSP). The IOTWS has been developed as an End-to-End Tsunami Warning System focuses on human security, using state of the art technology. The upstream includes detection, verification, threat evaluation, tsunami forecast, warning dissemination and the downstream includes, delivery of public safety message, initiation of national counter-measures, preparation and implementation of standardised response.

The establishment of the IOTWS was facilitated by working groups, covering the three principal pillars,

- Risk Assessment and Reduction (collect data and undertake risk assessment)
- Detection, Warning and Dissemination (develop hazard detection, monitoring and early warning services and communicate threat information and early warnings)
- Awareness and Response (build national and community response capabilities)

The IOTWS represents a highly successful collaborative effort by the member states. The paper

- presents key learning achievements and good practices
- highlight policies which had to adopted on capacity development which had to be undertaken both with respect to technology and institutional development
- identify measures which had to be taken to promote institutional coordination, exchange of data and information and vital links of dialogue across a region
- focuses heavily on the ocean basin wide enhancement of awareness, preparedness and response to provide human security for more twenty five members states along the Indian Ocean rim.

**Keywords:** early warning system, dissemination of warning, tsunami risk, disaster preparedness, human security

## Gender aspects improving disaster resilience in Sri Lanka

*Kushani De Silva, University of Huddersfield, kushmadhu@yahoo.co.uk,  
Prof. Dilanthi Amarathunga, University of Huddersfield, d.amaratunga@hud.ac.uk*

In Sri Lanka as more than 35,000 lives were lost due to tsunami 2004. Therefore the Government with other agencies have implemented programmes to improve awareness and established tsunami early warning mechanisms. Nevertheless, first responses to an emergency will be via non-hierarchical and uncontrollable media with instant global distribution of images. This promotes vulnerable people making decisions on their own with the accessible available information saving lives and properties.

Social dimension of vulnerability deals with aspects of justice, social differentiation and societal organization as well as individual strength Resilience describes the capacities of societies, communities and individuals or a social-ecological system to deal with adverse consequences and the impacts of hazard.

Social dimensions in Sri Lanka include 18.3 % Urban, 77.3 % Rural and 4.4 % in Estate population of the total population 20,271,464. Sex ratio in the country is 94 males per 100 females indicates that in Sri Lankan population than males. Sex ratio among children below 18 is reported as 102 which indicate more males among child population while the corresponding figure for 60 or more population is 79 indicating more females among older population. From the total population 51.9% is economically active belongs to age 15 years and above out of which 75.8% are males and 30% are females.

As gender is societal meaning assigned to male and female. Gender Relations refers to a complex system of personal and social relations of domination and power through which they gain access to power and material resources or are allocated within society. Men and women with their gender roles have differences in capacities facing disasters and getting recovered. Mothers with their care giving role make decisions ensuring safety of children. Therefore, improving decision making capacity has the potential to influence on socially defined power dimensions such as Gender.

**Keywords:** gender, resilience, disasters, social

## Impact on tsunami reconstruction and recovery planning – case study of Hambantota, Sri Lanka

*Plnr. Indu .S. Weerasoori, Project Manager, UNHABITAT, indu@unhabitat.lk*

Tsunami which occurred in 2005 rendered an estimated one million people vulnerable, through damage to Property, loss of assets and livelihoods, damage to natural ecosystems, Coastal infrastructure, as well as disruption of social networks.

Sri Lanka had not experienced a natural disaster of this scale in recorded history.

Recovery planning and reconstruction posed an enormous challenge. Rebuilding of people's lives and recovering them was never going to be easy. Although the Sri Lanka Government was able to provide basic needs, and restore basic services quickly with generous local, national, and international help meeting the demand. Just working to make the built environment "safe" is not sufficient. Communities are sustainable and healthy when they are well governed and growing by driving economic development while also protecting their cultural heritage.

The objective of this study is to find out the impact on tsunami reconstruction and recovery planning and assess how far this reconstruction and recovery planning link with, sustainable socio economic development.

The geographic impact of the Tsunami was uneven. Much of the coastal belt of Southern, Northern, Eastern and part of the western was damaged.

Hambantota town is selected as a case study.

Hambantota is a township of approximately 10,000 people located on the southern coast of Sri Lanka. A large part of the livelihood of local people is derived from fishing, salt harvesting from the local lagoon and other small-scale industries. Hambantota also provides trade in goods and services for the surrounding agricultural region, which produces rice, fruit, vegetables, livestock and dairy.

Hambantota suffered heavy loss of life and property from the Tsunami and has been in a healing and re-building phase since then. As a coastal town Hambantota had its own identity and cultural heritage. This paper examines the impact of reconstruction in Hambantota and prevailing issues and challenges.

**Keywords:** reconstruction, recovery planning, resettlement land, Hambantota

## Impacts of reconstruction on social cohesion and community formation

*Gunanayagam Vickneswaran, Lecturer, Dept. of Social Sciences, Eastern University, Sri Lanka*

Physical infrastructure is an essential component to a community to maintain its social order since infrastructural elements serve the needs of community members. Infrastructure includes not only the entities of physical construction, but also comprises the services including water and sanitation, health and education, transport and communications and so on. Physical infrastructure also lays the foundation for the social construction of community relationships and sets the basis for mutual social existence. Social order is most likely to be perturbed when infrastructural components of a community are destroyed. Restructuring the community life, therefore, necessitates reconstructing the physical infrastructure as part of post-disaster recovery.

This study is conceptually concerned with the relationship between physical and social infrastructures in communities and empirically sets its overall focus on the impacts of post-tsunami reconstruction on rebuilding community structure and in rehabilitating socio-cultural relationships among the affected community members.

The study specifically aims to analyze how effective the post-Tsunami reconstruction interventions have been in meeting the socio-economic needs of the community and to evaluate how elative these interventions in refurbishing social fabric in Tsunami affected communities.

This descriptive study is mostly reliant on qualitative data collected through individual and group interviews and case studies. Data collection was confined to several selected Tsunami affected Tamil and Muslim communities, both relocated and resettled, in Batticaloa and Ampara districts of eastern Sri Lanka.

The study found that, firstly, many construction interventions intended for serving physical and social needs of beneficiaries, have not lived up to expectations due to their structure and quality. Housing schemes in resettlement have not adequately provided facilities to beneficiaries. Moreover, relocated housing schemes are not often situated in the proximity of the sea, causing difficulties in livelihood for fishing communities. However, community buildings, newly established or renovated, are efficiently used by the community people for their multi-purpose gatherings. Interior roads, both renovated and newly built ones, are not in good quality and in dilapidated conditions due to neglect. Secondly, study examined whether the construction interventions assisted people to rebuild their social relationships in post-Tsunami period. Public buildings for fisheries and other targeted associations are more effective in serving community people to have frequent or periodical interactions in the forms of association meetings and other types of gathering. However, partiality in selecting beneficiaries for housing schemes and biased-political and administrative patronage in allocating resources to the community people have given rise to conflicts among community members and still causing disputes between affected people and authorities in the tsunami affected areas. Problems with regard to ownership of houses, boundary demarcations and buffer zones are further exacerbating the conflict situation among community members and between local people and administrative authorities. Relocated houses are seen by the people as creating social cleavages among them since relocation has set apart a portion of community members from the village communities. Thirdly, the study scrutinized whether the reconstruction projects have brought about changes in community structure or in relationship patterns. The perception of affected community people is that, conflicts and livelihood changes due to the post-Tsunami reconstruction interventions have promoted individualistic tendencies among Tamil community members and there is a decrease in reciprocal cooperation among community people in public ceremonies and rituals too. However, such developments are rarely observable in Muslim communities. They still maintain communal ties among them, despite displacement and relocation, at last partly due to this strong commercial orientation.

**Keywords:** displacement, relocating, social infrastructure, community cohesion, conflicts

## Rebuilding of tsunami-affected areas in Southern Sri Lanka: Technological innovations and interventions by University of Ruhuna in livelihood restoration and resilience building

*Prof. K.D.N.Weerasinghe, Chair, Dept. of Agric. Engineering, Faculty of Agriculture, University of Ruhuna Matara, Consultant, Asian Disaster Preparedness Center, (ADPC) Bangkok, Thailand), kdnweerasinghe@outlook.com*

*Prof. Ranjith Senaratne, Chair, Dept. of Crop Science, Faculty of Agriculture, University of Ruhuna, ransen.ru@gmail.com*

The paper revisits and discusses the outcomes and the experiences gathered in sustainable livelihood development programs developed by the Faculty of Agriculture, University of Ruhuna in tsunami-affected areas of the Matara District in collaboration with several national and international agencies during the period of 2004- 2014.

The programs helped to develop successful stories in livelihood restoration as community participation projects of pilot scale in two peri-urban villages, namely Madiha, and Gandara, and in paddy ecosystems in the Nilwala downstream. The technological interventions for livelihood restoration have been made primarily through undergraduate and post-graduate training and research programmes with community engagement, for which field research and demonstration centers have been established in the said villages.

Sustainable Rural Livelihood (SRL) framework and Farming Systems approach have been deployed in all the programmes as a means of resilience building and livelihood restoration. Technological interventions and innovations such as small scale bio-gas technology as a source of household energy and manure, model home gardens with appropriate hydroponics techniques, household waste management through composting, mushroom culture, animal farming, solar-energy based fish drying technology, rainwater harvesting and ground water restoration programmes for sustainable water availability and development of rural marketing channels have been well integrated into the villagers' lives to improve their home economies, social lives and environment.

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**Keywords:** biogas technology, hydroponics, livelihood, resilience building, technological interventions

## Tsunami recovery - an overview of the recovery process and persisting issues

*Siri Hettige, University of Colombo*

We are getting closer to the tenth anniversary of the Indian Ocean Tsunami that devastated most of the communities in the Eastern and Southern coastal areas of Sri Lanka. The recovery effort that followed has been unprecedented given the massive response that the country received from local people, the international community, international non-governmental organizations and others. Most of the people who lost their houses, other properties, and personal belongings were resettled within a few years. The challenges the country faced were many. Establishment of new settlements, or restoration of existing ones, provision of social infrastructure, restoration of livelihoods, extending social and psychological support to traumatized people, protection of the vulnerable such as children, the disabled, the sick, the elderly, etc. creating a sense of community among people who were torn apart by the disaster, etc. demanded a coordinated and concerted effort on the part of various institutions and actors involved. Given the large size and the diversity of the population affected by the disaster, one would naturally expect certain variations in the outcomes of the recovery effort.

In this paper, we attempt to survey the conditions prevailing in a number of selected resettled communities in eastern and southern Sri Lanka in terms of a number of aspects of the recovery process. Based on qualitative data collected from these communities, we make an assessment of the conditions prevailing in these communities. Based on this qualitative assessment, an attempt is made to rank communities in terms of a number of selected indicators to show the extent and nature of recovery in each community. And, finally, we propose a methodology that could be used to monitor and evaluate the impact of disaster recovery efforts following a major natural disaster resulting in mass displacement of people.

**Keywords:** recovery, methodology, Sri Lanka

## Returning to the coast 10 years after the tsunami: involuntary relocation, case of Galle, Sri Lanka

*Nishara Fernando, Senior Lecturer at the Department of Sociology, and the Acting Director of SPARC, University of Colombo, nishara.fernando@gmail.com*

Imposition of 100 meter buffer zone after the 2004 tsunami resulted in involuntary relocation of more than 70,000 Tsunami affected families in mostly donor built settlements. The objective of such relocation was to protect them from future Tsunamis and other coastal hazards. These displaced families lived in the buffer zone in the Galle city area prior to the tsunami. They aspired to settle down in new settlements in the Galle city limits, closer to the sea in order rebuild their livelihoods. This did not materialize for most of the affected families as the government could not find enough suitable government land within the city limits for donors to build new settlements. As a result, most of the larger tsunami relocated settlements were constructed outside the Galle city limits and most of the displaced families were involuntarily settled down in those new settlements despite new risks and stresses they would face in these new relocation sites. However, relocated families were optimistic of their future, particularly due to the promises given by the government officials and the politicians about a new life and future in the new settlements. It is against this background, that this paper makes an attempt to identify and discuss risks and stress factors emerging at different stages after relocation, namely, less than two years after relocation and two to five years after relocation. Some relocated families had difficulties in successfully coping and adapting to risks and stresses in the new settlements, which in turn led them to return to the coast by renting, selling or closing their new housing unit. This action in turn exposes them once again to coastal hazards 10 years after the 2004 Tsunami.

Three Tsunami relocated settlements (Green Village, Tea Garden Village and Cinnamon Garden) situated away from the city of Galle were selected for the study. Interviews with a randomly selected sample of heads of households were conducted in the years 2006, 2007 and 2011. Key informant interviews with government officials and in-depth interviews with some selected heads of households were also conducted. Interviews with host community members as well as relocated families who returned to the coast (or to their previous place) were also conducted.

It is evident from data that the returned families resulted due to a further reduction of buffer zone to 35 meters on one hand and difficulties to cope with multiple sources of risks and stresses generated by relocation (finding employment from the new place, new expenses, and distance to the city, poor quality houses and common infrastructure, conflicts between host and relocated communities, access to common property resources etc.) without much external assistance on the other. These situations have forced them to return to their previous lands as the last option. However, this situation led the government officials to expect more casualties and destruction from a future Tsunami. Renting and selling of tsunami houses is prevalent in new settlements although it is prohibited by the government. These activities have opened up another source of income for some families.

**Keywords:** involuntary relocation, livelihoods, planned settlements, social vulnerability

## Provision of social infrastructure to resettled victims of the tsunami

*Namal Weerasena, SPARC, University of Colombo, namalww@yahoo.com*

Social infrastructure is critically important to promote social well-being of the victims affected by disasters, particularly those displaced populations that had lost their tangible and intangible assets and had been resettled away from their familiar environments.

This study is focused on the provision of social infrastructure facilities to resettled people, in particular the impoverished and others who were vulnerable at the time when the tsunami struck and had not been able to cope with and recover from the disaster. Further, the tsunami had led to the loss of family members, employment, inherited land and house, a regular income and the former social standing. The objectives of the research were to:

- describe the type of social infrastructure facilities provided to the settlers in new locations
- examine the adequacy of social infrastructure facilities provided at the initial stage.
- analyze the issues that have emerged due to the inadequacy of social infrastructure facilities
- recommend suitable mitigation measures that could be employed by the State, NGOs and the community

The research was conducted in five Tsunami resettlement sites in the Galle District. Qualitative data collection techniques such as in depth interviews, focus group discussions, informal discussions and field observations were used.

The findings of the survey revealed that the provision of essential social infrastructure facilities to improve the quality of life of the people in one resettlement site has been highly successful, while in others, either the basic facilities had not been adequate or they were provided at the initial stages but since then has been neglected by both the external agencies as well as this communities.

As a result, most of the settlers are facing hardships today and some have moved back to their original coastal settlements, at last partly due to poor social infrastructure in the new settlement.

**Keywords:** relocation, resettlement, social infrastructure, well-being of resettlers



## Mainstreaming women in disaster risk reduction in the built environment

*Kanchana Ginige, University of Huddersfield, UK, k.ginige@salford.ac.uk*  
*Dilanthi Amaratunga, University of Huddersfield, UK, d.amaratunga@hud.ac.uk*  
*Richard Haigh, University of Huddersfield, UK, r.haigh@hud.ac.uk*

Natural disasters have long-term implications on sustainable development. They mainly destroy the built environment thereby hindering economic and social development, and causing environment degradation. Mainstreaming disaster risk reduction into the built environment is therefore critical for ensuring sustainable development. Improving the resilience of humans who live in the built environment, particularly the more vulnerable is a significant component of accomplishing overall disaster risk reduction in the built environment (DRR in the BE). Having observed women to be a group of humans more vulnerable to natural disasters due to social, economic, biological conditions and processes and their roles and responsibilities, it was recognised that it is important to mainstream them into disaster risk reduction within the context of the built environment. In this context, research based on which this abstract is written investigates the process of mainstreaming women, i.e. how the knowledge and needs of women, which help to reduce their disaster vulnerability, can be identified and integrated into the built environment. The research design of the study incorporates a social constructivism view point and associates with constructionism ontology and interpretivism epistemology. A literature review and a pilot round of interviews with experts in DRR in the BE were undertaken to improve the knowledge of the associated concepts pertaining to the research. Empirical investigation of the study incorporates a single case, mono method research, which deploys qualitative, in-depth interviews for data collection. Sri Lanka is the case study for the research whilst the interview respondents are a group of professionals involved in DRR in the BE of the country. Data analysis for the study follows thematic analysis and combines inductive reasoning and abductive reasoning in order to build systematic, explanatory accounts from concepts and meanings embedded in the interview responses. The study reveals the importance of the process of mainstreaming women into DRR in the BE whilst demonstrating the various types of DRR knowledge and needs of women and, methods that facilitate identification of the needs and knowledge, and the ways of integrating them into the built environment. A set of guidelines is developed to inform the process of mainstreaming, identifying the existing barriers, ways of promoting the process, parties responsible, relevant protocols and suggestions for good practice in implementing the process. Improvements to the regulatory framework, enhancement of essential resources and awareness building of all relevant parties are considered to be the main ways towards process improvement.

**Keywords:** women, built environment, mainstream, disaster risk reduction

## Empowering local governments in making cities resilient to disasters

*Chamindi Malalgoda, University of Huddersfield, UK, c.i.malalgoda@salford.ac.uk*

*Dilanthi Amaratunga, University of Huddersfield, UK, d.amaratunga@hud.ac.uk*

*Richard Haigh, University of Huddersfield, UK, r.haigh@hud.ac.uk*

Urban areas are growing rapidly all over the world, particularly in the developing nations. As a result of rapid urbanisation, cities are becoming extremely vulnerable to natural disasters. Thus, it has become necessary to make cities more resilient to disasters. The built environment is a core element in every city and facilitates the everyday lives of human beings. Disasters can have a huge impact on the built environment and the failure of the built environment can create significant impacts on the social and economic activities of the entire nation. Thus, when moving towards safer cities it is important to develop the built environment in such a way that it can adapt to the threats posed by natural disasters. Various stakeholders need to become involved in the process of making disaster resilient built environments, and local governments have a critical role to play as they are the closest government body to the local community. It is the duty of the local government to enhance the well-being of the local community and to protect them from natural and human induced hazards. This study, therefore, has recognised municipal councils to be key players in this exercise and has highlighted the invaluable role of municipal councils in leading to safer built environments in cities. Even though there is growing concern among researchers and practitioners regarding the lead role required of local government in making disaster resilient built environments, several issues have been reported about the inadequate contribution made by local governments in implementing disaster risk reduction initiatives. Therefore, this research, aims to develop a framework to empower local governments to make cities resilient to disasters in the context of the built environment.

The research adopts case studies as its research strategy and investigates three cities in Sri Lanka which are potentially vulnerable to disasters. A number of expert interviews have also been conducted to supplement the case study findings. Based on empirical investigation it was evident that Sri Lankan municipalities face a number of challenges in their efforts to create safer built environments, and therefore, the study proposes a number of recommendations for empowering Sri Lankan municipalities to lead the endeavours to build disaster resilient built environments. Nevertheless, it is important to note that municipal councils cannot work in isolation and for them to be effectively engaged they require the assistance of central government and other related government organisations, community based organisations, NGOs, private sector and the local community. Therefore, the study reveals the importance of defining the scope and responsibility of each of these organisations and community groups towards making a disaster resilient built environment within the city under municipal jurisdiction. The key findings suggest that central level agencies need to take the lead in making policy level decisions and initiating necessary amendments to existing policy to make municipalities responsible for creating disaster resilient built environments within cities. In doing so, it is important to provide solutions to prevailing issues such as financial and technical capabilities and legal authority. The findings further revealed the importance of consulting municipal councils in all decisions made at national level in relation to municipal territories. Finally, all relevant development plans, risk maps, disaster resilient planning, construction and operation guidelines and resilient land use practices need to be integrated into existing building and planning regulations and proper coordination, monitoring and control of mechanisms have to be established and have skilled leadership to ensure compliance with regulations.

**Keywords:** local government, empowerment, risk reduction, built environment



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