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Symposium on Making cities resilient: how local governments can reduce disaster risks realigning with Sendai Framework for Disaster Risk Reduction

Book of Abstracts

University of Huddersfield, United Kingdom
11th September 2018

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Symposium on Making cities resilient: how local
governments can reduce disaster risks
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Risk Reduction

Book of Abstracts

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University of Huddersfield, United Kingdom
11th September 2018

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(edited by)

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Preface

“Making Cities Resilient” is a global campaign which is led by The United Nations Office for Disaster Risk Reduction (UNISDR) and its partners. This campaign addresses issues of local governance and urban risk in the broader scope of managing disaster risks and works towards sustainable urbanisation by taking proactive actions. The main feature of this campaign is that it is a city-driven approach with an aim to raise the profile of resilience and disaster risk reduction among local governments and urban communities worldwide. This campaign also serves as a mean of supporting the Sendai Framework for Disaster Risk Reduction (2015-2030) following on from its earlier support on the Hyogo Framework for Action (HFA), 2005-2015.

Global Disaster Resilience Centre (GDRC) at the University of Huddersfield has been a long-standing advocate of the programme and its members have played a key role in making the Manchester a “role model city” in the campaign.

Sri Lanka as a country can benefit from this programme immensely, specially in making plans to reduce long standing disaster risks in some of its cities. Undoubtedly, the higher education institutions can play a major role in such attempts contributing to both strategic and operational planning and policy making to manage localised disaster risk reductions.

It is therefore with great pleasure that we welcome delegates to this 14 days research training event and for the Symposium on Making cities resilient: how local governments can reduce disaster risks realigning with Sendai Framework for Disaster Risk Reduction. The symposium was organised as part of RECADOS – TM training event on “Making Cities Resilient around the world”. RECADOS –TM is a European Commission funded Erasmus+ International Credit Mobility (ICM) project which support student and staff mobility to and from countries outside Europe. Accordingly, this research training programme and Symposium is designed as a research capacity building and awareness programme targeting the disaster management researchers in the main higher education institutions in Sri Lanka.

Acknowledgements

As Chairs of the Symposium on Making cities resilient: how local governments can reduce disaster risks realigning with Sendai Framework for Disaster Risk Reduction, we are delighted to have the opportunity to hold this Symposium. The symposium was organised as part of RECADOS –TM training event on “Making Cities Resilient around the world”. RECADOS –TM is a European Commission funded Erasmus+ International Credit Mobility (ICM) project and we would like to acknowledge the financial support of the European Commission and the Erasmus+ Programme of the European Union in facilitating this Symposium in conjunction with the RECADOS –TM training event. The Symposium also has formal links with Mainstreaming integrated DRR and CCA strategies into coastal urban agglomeration policy (NUAR); REbuilding AfteR Displacement (REGARD); Advancing Skill Creation to ENhance Transformation (ASCENT) Capacity Building in Asia for Resilience EducaTion (CABARET); Enhancing Synergies for Disaster Prevention in the European Union (ESPRESSO); Tsunami interface (A study of the upstream-downstream interface in end-to-end tsunami early warning and mitigation systems) projects.

We also thank all participants from University of Moratuwa, University of Colombo, University of Peradeniya, University of Ruhuna and South Eastern University of Sri Lanka for attending the RECADOS –TM training event and the project coordinators, Dr. Indrika Rajapaksha, Dr. Nishara Fernando, Dr. Ranjith Dissanayake, Prof. Champa Navaratne, Prof. Nandasiri Weerasinghe, and Dr. BGN Sewwandi for all the support in organising this event.

We have received exceptional help and support from a number of people, organisations and bodies in the work for this Symposium and training event. We would particularly like to acknowledge the support of Oshienemen Albert from the Global Disaster Resilience Centre at the University of Huddersfield for being the focal point in the organisational aspects of the Symposium and the training event. Sheila Furmedge, Susan Beverley, Alison Holmes and Sharon Matthewman of University of Huddersfield also deserves a special mention for supporting the logistical and other administrative activities around the Symposium and Rachel Mountford and Abby Butcher for designing the cover page. We would also like to thank Dr. Nuwan Dias, Kinkini Hemachandra, Georgina Clegg and all the PhD students of the Global Disaster Resilience Centre for being there whenever we needed help.

Finally, we would like to thank all the participants from Sri Lanka and the UK for their active participation at the Symposium and for their positive commitments towards the RECADOS –TM project activities. Most of all, we want to thank the speakers for their willingness to stimulate invaluable discussions and debate around the symposium theme.

Dr. Chamindi Malalgoda, Prof. Dilanthi Amaratunga & Prof. Richard Haigh

Chairs of the Symposium on Making cities resilient: how local governments can reduce disaster risks realigning with Sendai Framework for Disaster Risk Reduction

Symposium organisation

Organised by

RECADOS TM Research Capacity Development for Staff (Training Mobility)
Global Disaster Resilience Centre, University of Huddersfield, UK

In association with

Mainstreaming integrated DRR and CCA strategies into coastal urban agglomeration policy (NUAR)
REbuildinG AfteR Displacement (REGARD)
Advancing Skill Creation to ENhance Transformation (ASCENT)
Capacity Building in Asia for Resilience EducaTion (CABARET)
Enhancing Synergies for Disaster Prevention in the European Union (ESPREsso)
Tsunami interface (A study of the upstream-downstream interface in end-to-end tsunami early warning and mitigation systems)

With the support of

ERASMUS + (The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.)

Organising Committee

Dr. Chamindi Malalgoda, University of Huddersfield, UK
Professor Dilanthi Amaratunga, University of Huddersfield, UK
Professor Richard Haigh, University of Huddersfield, UK
Oshienemen Albert, University of Huddersfield, UK

RECADOS TM Research Capacity Development for Staff (Training Mobility)



This is a staff mobility project between University of Huddersfield in the United Kingdom and five Higher Education Institutions in Sri Lanka. The mobility project is funded by the European Union Erasmus+ International Credit Mobility Programme. The project focuses on the need to develop research capacities amongst academic staff members of the two participating countries, in the field of Disaster Resilience.

Among many communities in the EU and beyond, disasters pose significant concerns and challenges. With growing population and infrastructures, the world's exposure to hazards is increasing. The geographical distribution of natural disasters has been unequal, leaving some regions being more vulnerable to disaster than others. In the last three decades, EM-DAT (2013) records of the natural disasters for the period of 30 years between 1984 and 2013 shows that Asia experiences the most disasters with nearly 3,400 disaster events, more than US\$ 1,084 billion worth of damage, and more than 1.1 million fatalities. In addition to loss of life, disasters greatly hamper the social-economic capacity of these countries. Within this context, improving the research capacities of these countries to deal with disaster events is more important than ever before.

Being one of the worst disaster effected countries in the world in the recent years, research capacity development is one of the most critical challenges facing Higher Education Institutions (HEIs) in Sri Lanka today. In the past, allocation of resources and the attention given for research capacity development has been less than satisfactory in these HEIs. Growing the number and quality of researchers is therefore a strategic issue. In this context, this staff mobility programme between Sri Lanka and the UK focuses on some of the most pressing issues for researchers and universities, in the context of building and sustaining research capacity in disaster resilience.

Proposed mobility activities aim to ensure that chosen HEIs in Sri Lanka have the research and innovative capacities to tackle the challenges associated with developing societal resilience to disasters. This will be done through participation in a structured set of unique research capacity development activities via staff exchanges that will progressively build the capacity of staff to undertake and communicate high quality and policy/practice relevant research. In doing so, this programme focuses on a subject area (Disaster Resilience) and a country (Sri Lanka) not sufficiently addressed by projects already being funded under this scheme in previous years.

In this context, the desired impact of this mobility project is of two folds, at micro level (individual and institutional level), and at macro level (local, regional and national level). At micro level the individual staff members will benefit from enhanced research capabilities and skills. Staff who take part in the exchange programme will also benefit in many other ways: Social sensitivity and maturity, coupled with the ability to operate effectively in a new environment (via capturing skills in working in different cultures); Ability to thrive under ambiguity, especially in instances where theirs might be the first staff exchange; Time management skills in delivering their task that has been allocated to them; Personal development will be enabled with exposure to novel conditions; Exposure to new knowledge and skills of which the staff were not previously aware; Exposure to new ways of working and different cultures. In this way, staff exchanges will nurture the related staff member, fulfilling research with clear objectives under mentorships, the change in environment enabling the staff member to fulfill their potential. Staff take part in exchanges will also transfer knowledge back to their sending institution in several ways: Acquiring and assimilating new capabilities, especially those of long-term and strategic significance; that they can put into practice once they return to their original position - these skills can then be communicated across the team and other sections within the organization to improve and enhance the skill set of other staff; Give the organization the opportunity to build a wider network and better appreciates 'skill value' in employees ; Enhance skills

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such as team working and cross-functional communications (e.g., working in teams in delivering a common research task); Building a broader network of contacts, typically to access new insights and new capabilities

Institutional wide, this mobility project addresses the core objectives of internationalisation strategies of all the institutions. In particular, it contributes directly to research priorities of internationalisation strategies of all institutions involved. Hence this mobility project makes a significant impact institutional wide in all involved institutions. The following are some of the ways that this proposed staff exchange programme will enable transferring of knowledge to the host: Gains an external perspective and a new flexible way to add skill and experience; and Learns and gains knowledge and value from skills and experience from the staff member who is participating in the exchange.

In this way, this proposed staff exchange programme between HUD and identified Universities in Sri Lanka will create benefits, not only at individual and university level but also outside of them within Sri Lanka and the UK and also regionally and globally. In this context, it is hoped this will contribute to a step change in research training cultures within partner institutions via empowered individuals to serve as advocates and role models of good research practice, including to communicate and demonstrate the value of research, help create demand and spread their experiences more widely in institutions and future networks.

In this context, there will also be a self-sustainability of the partnership after the end of the project. The proposed “training activity schedule” will be designed to ensure that the project achieves its intended outcomes and that the impact on the target groups is sustained beyond the lifespan of the initial project fulfilling the concept of sustainability, which consists of principles and practices that ensure lasting, autonomous and self-perpetuating change for an extended period after this exchange project ends.

Project team:

Dr. Chamindi Malalgoda, University of Huddersfield, UK

Prof. Dilanthi Maratunga, University of Huddersfield, UK

Prof. Richard Haigh, University of Huddersfield, UK

Dr. Indrika Rajapaksha, University of Moratuwa, Sri Lanka

Dr. Nishara Fernando, University of Colombo, Sri Lanka

Dr. Ranjith Dissanayake, University of Peradeniya, Sri Lanka

Prof. Champa Navaratne, University of Ruhuna, Sri Lanka

Prof. Nandasiri Weerasinghe, University of Ruhuna, Sri Lanka

Dr. BGN Sewwandi, South Eastern University of Sri Lanka, Sri Lanka

Project partners:

University of Huddersfield, UK (Lead)

University of Moratuwa, Sri Lanka

University of Colombo, Sri Lanka

University of Peradeniya, Sri Lanka

University of Ruhuna, Sri Lanka

South Eastern University of Sri Lanka, Sri Lanka

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Global Disaster Resilience Centre, University of Huddersfield, UK (GDRC)



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 Centre for Disaster Resilience we are working with stakeholders at the global, national and local level to make this happen.

The Global Centre for Disaster Resilience 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.

At the Global Centre for Disaster Resilience, our vision is for a society that has the capacity to resist or change in order to reduce hazard vulnerability, and to continue functioning physically, economically and socially when subjected to a hazard event.

We seek to achieve our vision by undertaking work that crosses the traditional boundaries between academic disciplines and schools of thought. We provide strategic advice and practical guidance based on rigorous, stakeholder informed research. We are also supported by a worldwide network of partners from policy, government, industry and academia.

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.

For more information about our research, teaching and advocacy, please contact: Professor Dilanthi Amaratunga & Professor Richard Haigh, Global Centre for Disaster Resilience, University of Huddersfield, Queensgate, Huddersfield, HD1 3DH, United Kingdom. w: www.hud.ac.uk/gdrc.

e: d.amaratunga@hud.ac.uk / r.haigh@hud.ac.uk.

Linked projects

NUAR (Mainstreaming integrated DRR and CCA strategies into coastal urban agglomeration policy)

Outline:

Coastal urban agglomerations are especially exposed to the impacts of climate change and disaster risks. In the coming decades, climate-induced extreme events are expected to increase and will continue to affect natural and human systems independently or in combination with other determinants to alter the productivity, diversity and functions of many ecosystems and livelihoods. Climate change and disaster impacts threaten to exacerbate existing vulnerabilities and further entrench development disparities.

There is also increasing recognition that disaster risk reduction (DRR) should include climate change adaptation (CCA). These two perspectives have been developed by different communities, but the aim of both is to reduce vulnerability and hazard exposure in order to increase resilience to the potential adverse impacts of climate extremes.

This collaboration and research project will develop researcher capacity and novel, integrated DRR and CCA strategies that can protect centres of economic growth and development outcomes in coastal urban agglomerations. Through documented Indonesia case studies and international good practices, and a stakeholder map of DRR and CCA actors at the city level, the project will develop a multi stakeholder transition pathway and a clear policy statement on mainstreaming DRR and CCA in Indonesia's coastal urban agglomeration development plan.

The project will reduce disaster risk, including human and economic losses, and create more resilient, connected communities. It will foster multi-stakeholder involvement in development processes and equal participation of groups who are often excluded, such as women, children and youth, and people with disabilities. It will directly contribute to Indonesia's efforts in working towards the targets set out in the global agreements on disaster risk reduction (Sendai Framework), Climate Change (COP21) and Sustainable Development Goals.

Outputs and impact achieved so far:

Joint research papers

Rahayu, H. P., Haigh, R., & Amaratunga, D. (2018). Strategic challenges in development planning for Denpasar City and the coastal urban agglomeration of Sarbagita. *Procedia Engineering*, 212, 1347-1354. DOI: 10.1016/j.proeng.2018.01.174

Amaratunga, D., Malalgoda, C., Haigh, R., Panda, A., & Rahayu, H. P. (2018). Sound Practices of Disaster Risk Reduction at Local Level. *Procedia Engineering*, 212, 1163-1170. DOI: 10.1016/j.proeng.2018.01.150

Joint proposals and awards (since April 2017)

Research proposal on Mitigating hydro meteorological hazard impacts through improved transboundary river management in the Ciliwung River Basin (submitted in February 2018, awaiting outcome)

Haigh, Rahayu and Amaratunga jointly submitted a proposal entitled 'Mitigating hydro meteorological hazard impacts through improved transboundary river management in the Ciliwung River Basin' to the Understanding of the Impacts of Hydrometeorological Hazards in Indonesia, a call by Indonesia's Ministry of Research, Technology and Higher Education of the Republic of Indonesia (Ristekdikti), UK's Natural Environment Research Council (NERC) and Economic & Social Research Council (ESRC).

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Research proposal on 'A study of the upstream-downstream interface in end-to-end tsunami early warning and mitigation systems' (awarded in October 2017)

In October 2017 Amaratunga, Rahayu and Haigh secured a grant of £67,250 from a GCRF additional funding restricted call 2017/2018 at the University of Huddersfield. The planned activity will involve a detailed study of the technical, legal and socio-cultural complexities involved in communicating the rapid detection of a tsunami wave to jurisdictional agencies and response partners.

Research proposal on 'Dynamics of displacement related to complex natural hazards: landslides in perspective' (submitted in March, 2018, unsuccessful)

The £25,000 proposal was submitted to the GCRF/Networking grant/Academy of Medical Sciences. Co-leaders were the University of Colombo, Sri Lanka and GDRC, University of Huddersfield. Partners included ITB, Indonesia, the Department of Geography and Resource Development, University of Ghana, Ghana, the Malawi University of Science and Technology, Malawi, and the University of Moratuwa, Sri Lanka.

Research proposal on 'Socially inclusive and equitable infrastructure development that contributes to improving links between disaster risk reduction and conflict prevention among communities in the Aceh Province, Indonesia' (submitted in June 2018, awaiting outcome)

Professors Amaratunga and Haigh visited Syiah Kuala University in Aceh to collaborate on a proposal for Socially inclusive and equitable infrastructure development that contributes to improving links between disaster risk reduction and conflicts prevention among communities in the Aceh Province, Indonesia. The proposal was submitted to the Newton Fund, valued at £125,338.

International Workshop on Science and Technology Contribution in Policy Improvement and Capacity Building for Advance-Early Warning System against Near-Field Tsunami Risk, Bali, Indonesia, 21-23 August 2017

The Newton agglomeration project was presented as part of the research and serial event of ITB's 100 anniversary commemoration, an international workshop on "Science and Technology Contribution in Policy Improvement and Capacity Building for Advance-Early Warning System against Near-Field Tsunami Risk". This was conducted to present and disseminate the result of research mainly on the issue people center tsunami early warning system, end-to-end and effective tsunami early warning system and emergency response. The workshop also engaged ITB's partners at national and international level to obtain their knowledge and experiences in conducting research related to tsunami disaster and building resilience of coastal communities from regional perspective.

Joint engagement activities, collaborations and partnerships

UK-South East Asia Researchers Networking workshop – Understanding the Impact of Hydrometeorological Hazards in South-east Asia

Haigh and Rahayu took part in 'The Understanding the Impact of Hydrometeorological Hazards in South East Asia UK-South East Asia Researchers Networking workshop', which took place over two days, 10 – 11 October 2017 in Depok, Indonesia. The Faculty of Mathematics and Natural Sciences (FMIPA), University Indonesia and the Ministry of Research, Technology & Higher Education of the Republic of Indonesia (Ristekdikti) hosted the workshop. The networking workshop had two overarching aims: 1. To launch the five Understanding of the Impacts of Hydrometeorological Hazards in South East Asia programme interdisciplinary calls and present an overview of the call aims and objectives. 2. To facilitate links between the UK and Southeast Asian research communities in the area of hydrometeorological hazards by providing an opportunity for researchers to network and begin to develop ideas to address the aims of the call. The emphasis of the workshop was an opportunity for facilitated discussions between researchers and as a result, there was no formal report back from each of the breakout sessions.

Intergovernmental Oceanographic Commission of UNESCO's Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System Task Team on "capacity assessment and tsunami preparedness"

The Intergovernmental Oceanographic Commission of UNESCO's Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System was formed in response to the tragic tsunami on December 26th, 2004. It oversaw the development of the Indian Ocean Tsunami Warning and Mitigation System and includes early warning technology such as seismographic stations and deep-ocean assessment and reporting of tsunami buoys. It has established the Working Group and Tasks Team set up to establish and implement working plans in the Indian Ocean region. Dr Harkunti Rahayu is the Chair of Working Group-1 on Tsunami risk community awareness and preparedness. Professors Amaratunga and Haigh are invited experts of a working group on "Tsunami risk, community awareness and preparedness", as well as a task team on "capacity assessment and tsunami preparedness".

4th International Conference on Earth Sciences and Engineering, 29th–31st August 2017, Andalas University, Padang, Indonesia

The Newton agglomeration project was presented at this event, organised by associate partner the Andalas University, Padang, Indonesia and Cafet Innova Technical Society (CITS), Hyderabad, Telangana, India. The 4th International Conference on Earth Sciences and Engineering (ICEE–2017) was held during 29th–31st August, 2017. The conference brought together and provide a platform to Researchers, Engineers, Scientists and Academicians as well as Industrial Professionals from all over the globe to present, share and exchange their research results and developmental activities about all parts of earth sciences and engineering. Professor Amaratunga delivered a keynote address on 'UN Sendai Framework for Disaster Risk Reduction 2015-30: Role of Science and Technology in Perspective'

Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS) 1st Integrated Intersessional Meetings Jakarta, Indonesia, 4 – 17 September 2017

Rahayu, Haigh and Amaratunga attended the inaugural Task Team on Capacity Assessment of Tsunami Preparedness (TT-CATP) to design and field test the modified national report template before circulating it to the IOTWMS Member States.

Interviews and public engagement events around Denpasar City, Bali, Indonesia, August 2017

As part of field data collected in Denpasar City and the surrounding regencies, a series of interviews and focus group discussion were held with local politicians and community leaders. This informed stakeholder mapping and identification of key issues on convergence of DRR and CCA within development planning.

International Conference on Disaster Management, 2-4 May 2018, Padang City, Indonesia

The International Conference on Disaster Management 2018 (ICDM 2018) is a premier forum for the presentation of new advances and research results in the field of Disaster management. ICDM 2018 was the first International conference organized by Andalas University (UNAND), Padang, Indonesia; Indonesian Disaster Expert Association (IABI); and Indonesia National Disaster Management Authority (BNPB). Contributions at the conference included: Professor Haigh delivered a keynote on 'Mobilising Higher Education in Disaster Risk Reduction' and Professor Amaratunga chaired a plenary keynote session.

Visit to Syiah Kuala University, Aceh Province, Indonesia, May 2018

Professors Amaratunga and Haigh visited Syiah Kuala University in Aceh to collaborate on a proposal for Socially inclusive and equitable infrastructure development that contributes to improving links between disaster risk reduction and conflicts prevention among communities in the Aceh Province, Indonesia. The proposal was submitted to the Newton Fund, valued at £125,338, and was jointly submitted between the Global Disaster Resilience Centre, University of Huddersfield, UK, and the Tsunami and Disaster Mitigation Research Centre, Syiah Kuala University, Banda Aceh, Indonesia. Partners include the Aceh Development

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Agency (BAPEDDA), Aceh Disaster Management Agency (BPBA), Aceh Reintegration Agency (BRA), Aceh Reintegration Agency (BRA).

UNESCO IOC Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS), Intersessional Meetings of Working Group 1 on "Tsunami Risk, Community Awareness and Preparedness" and "Task Team on Capacity Assessment of Tsunami Preparedness (TT-CATP)" at Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, India, July 2018

Dr Rahayu, Professor Haigh and Professor Amaratunga attended the Intersessional Meetings of Working Group 1 on "Tsunami Risk, Community Awareness and Preparedness" and "Task Team on Capacity Assessment of Tsunami Preparedness (TT-CATP)", aimed to building capacity for tsunami early warning in the Indian Ocean. The team are leading the development of a capacity survey instrument that will be used to assess the capacity of all states involved with the Indian Ocean Tsunami Warning and Mitigation System, including Indonesia.

Future tasks:

Joint reports

The project will produce several reports linked to the research programmes. These will be made available for download during the project:

- A synthesis of existing DRR and CCA strategies in urban development processes
- Documented Indonesia case studies and international good practices, lessons learned, methodologies and tools can be used to enhance the integration of DRR and CCA in development processes in coastal cities
- A stakeholder map of DRR and CCA actors at the city level, including communication and collaboration channels
- Coastal hazard risk profiles from two agglomeration metropolitan cities
- A multi-stakeholder transition pathway for integrated DRR and CCA in urban development planning for two case study cities
- Policy statement on mainstreaming DRR and CCA in the coastal urban agglomeration development plan for two case study cities

Journal special issue

A special issue will be Guest Edited in the Scopus indexed International Journal of Disaster Resilience in the Built Environment. Further details will be announced in due course.

9th International Conference on Building Resilience 2019, Denpasar, Indonesia

ITB and the University of Huddersfield will jointly host the 9th International Conference on Building Resilience in the 4th quarter of 2019. Dr Rahayu, Professor Haigh and Professor Amaratunga recently visited the proposed venue in Denpasar, Bali, Indonesia, which is currently under construction. The call for papers will be issued in November 2018. Previous Building Resilience Conferences have attracted over 300 delegates, and have been held in Sri Lanka, the UK, Australia, New Zealand, Thailand and Portugal. The event will be used to disseminate the outcomes of this project and other joint work between the institutions.

Project team:

Professor Richard Haigh, University of Huddersfield, UK

Dr Harkunti Rahayu, Bandung Institute of Technology, Indonesia

Professor Dilanthi Amartunga, University of Huddersfield, UK

The project is jointly funded by the British Council Institutional Links Newton Fund and Indonesia's Ministry of Research, Technology and Higher Education of the Republic of Indonesia (Ristekdikti).

The Newton Fund is part of the UK's official development assistance programme. The fund is £75 million each year from 2014 for five years. Through the Newton Fund, the UK will use its strength in research and innovation to promote economic development and social welfare of partner countries. By working together on research and innovation projects, the UK will build strong and sustainable relationships with partner countries. This will support the continued excellence of UK research and innovation to unlock opportunities for wider collaboration and trade.

Project partners:

IOC – UNESCO ICG/IOTWMS

National Disaster Management Agency (BNPB)

Meteorology, Climatology and Geophysical Agency (BMKG)



REbuildingG AfterR Displacement (REGARD)

Outline:

Immediately following a disaster and conflict-induced displacement a community will undergo resettlement as a process of recovery comprising efforts to restore the displaced community's equilibrium level from different perspectives. Resettlement is also a process that introduces new built environment (BE) for the displaced. This new BE potentially redefines the social system as one interlinked with other subsystems of the community. However, following a fundamental change in the system, restoring the earlier equilibrium is almost impossible. When BE is concerned, the most overlooked aspect of understanding and determining the success of the resettlement is the role of the host community. A sudden change in the pattern of interaction with the BE would have an immediate effect on the stability of the host community. Consequently, both the communities will suffer stress in adapting to the new BE.

Based on that assumption, ways to determine the success of resettlement are discussed, however, superficially in some of the literature. Failure regarding BE has been recorded based on the inappropriate house design, insufficient infrastructure, and inappropriate new environment. Further, the economic status of the displaced community, bureaucratic tendencies of the government and issues of discrimination are also recorded as reasons for failures linked with the change in BE.

A number of international initiatives included this issue in their policies including the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, the World Humanitarian Summit, the New York Declaration for Refugees and Migrants, and, most notably, the Nansen Initiative on Disaster-Induced Cross-Border Displacement and its successor, the Platform on Disaster Displacement. However, UNHCR (2017) imposes that these are not sufficient and more is required. The reasons for this insufficiency or the gap are; difficulty in measuring the relationship between disasters and displacement and political restrictions of displacement. Further, the BE perspective of post-disaster and conflict-induced displacement has less academic engagement and is seldom addressed in policies. Consequently, these policies become ambiguous for the governments that are trying to implement. Thus, a comprehensive approach is needed to fill in the policy gaps of disaster and conflict-induced displacements.

Accordingly, the aim of the project is to develop competencies in rebuilding communities following disaster and conflict induced mass displacements from the perspective of the built environment. In achieving this aim, the following objectives have been set out.

- To identify the needs of the communities following disaster and conflict induced mass displacements in the perspective of built environment
- To investigate the role of the built environment in enhancing social cohesion between host and displaced communities
- To explore the knowledge, skills and competencies required by the built environment professionals to address the needs of the host and displaced communities
- To develop, test and implement an innovative series of training courses in catering the needs of the host and displaced communities
- To develop associated curricula and resources for teachers and learners
- To introduce new uses of ICT in education by formulating technology-enhanced learning environments and materials to facilitate teaching and learning
- To propose policy recommendations to BE professional bodies in upgrading the professional competencies to address the needs of the host and displaced communities

The project aims to develop competencies in rebuilding communities following disaster and conflict induced mass displacements from the perspective of the built environment (BE). In achieving this aim, a number of objectives have been set out as detailed in the above section. Accordingly, the project will

address the needs of the host and displaced communities following disaster and conflict induced mass displacements and facilitate successful resettlement. In enabling this, project will address the knowledge gaps of BE professionals and help improving their competencies. The project also inform policy recommendations to BE professional bodies in upgrading the professional competencies to address the needs of the host and displaced communities. In doing so, project seek to develop a number of outputs, organise a number of multiplier events and training activities in rebuilding communities following disaster and conflict induced mass displacements.

Future tasks:

It is intended to carry out a community needs analysis to identify the needs of the host and displaced communities following disaster and conflict induced mass displacements which will inform policy in rebuilding communities. The community need analysis will also inform the competency framework that will be developed at a later stage of the project, in identifying the competencies required for BE professionals to address the needs of the host and displaced communities. The project will further develop a synthesis report on the role of the BE in enhancing social cohesion between host and displaced communities and a guidance note with recommendations on best practices of rebuilding host and displaced communities. All these outputs will be developed through a rigorous scientific process and will directly contribute to the scientific theory of the domain. Based on these outputs, it is intended to produce a number of conference and journal papers and a special issue of a journal which will further enhance the knowledgebase.

The outputs discussed above will not only benefit theory but due to the importance of the subject matter within Europe and beyond, it will provide an important contribution to the practice in identifying the needs of the communities, identifying the role of the BE in enhancing social cohesion between host and displaced communities and recommendations on best practices of rebuilding host and displaced communities. These outputs will inform policy and will be helpful for national and local governments, international organisations, non-profit organisations and BE professional bodies to understand the issues related to rebuilding communities following disaster and conflict induced mass displacements from the perspective of the built environment.

Two stakeholder seminars will be organised, first, to disseminate the findings of the community need analysis and second to disseminate the role of the built environment in enhancing social cohesion and recommendations to rebuild host and displaced communities. In doing so, reach to target audience can be further ensured. In addition, a research symposium on “rebuilding communities following disaster and conflict induced mass displacements in the perspective of BE” will be organised to disseminate the findings of the above outputs and to share knowledge with academic and research community.

Based on the above outputs, a competency framework will be developed for BE professionals to understand key competencies required by them to better engage in rebuilding efforts. In further supporting the development of BE professionals, and contributing to resettlement efforts, the project will develop an innovative series of training courses for BE professionals in catering the needs of the host and displaced communities with associated curricular, and training materials. All training materials will be created as OERs and will be available open access to be used by any interested party. The training courses will be developed as online programmes, as Massive Open Online Courses (MOOCs) tailored for rapid skill acquisition for BE professionals involved in resettlements and available through project's virtual training environment. The MOOCs will provide an effective means of building capacity among a much wider pool of professionals in the Europe and beyond.

It is also intended to conduct a ‘Professional competence audit of BE professional bodies’ to understand the competency requirements that they expect from their professionals and based on that a policy report for BE professional bodies will be developed in upgrading the professional competencies to address the

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needs of the host and displaced communities. The project will organise number of meetings/ seminars with BE professional bodies, which will help in disseminating the policy report to the target audience.

Project team:

Dr. Chamindi Malalgoda, University of Huddersfield, UK

Prof. Dilanthi Maratunga, University of Huddersfield, UK

Prof. Richard Haigh, University of Huddersfield, UK

Dr. Champika Liyanage, University of Central Lancashire, UK

Prof. Irene Lill, Tallinn University of Technology, Estonia

Dr. Emlyn Witt, Tallinn University of Technology, Estonia

Prof. Mo Hamza, Lund University, Sweden

Dr. Marcus Abrahamson, Lund University, Sweden

Dr. Nishara Fernando, University of Colombo, Sri Lanka

Project partners:

University of Huddersfield, UK (Lead)

University of Central Lancashire, UK

Tallinn University of Technology, Estonia

Lund University, Sweden

University of Colombo, Sri Lanka



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ESPRESSO (Enhancing Synergies for Disaster Prevention in the European Union)

Outline:

This project aims to contribute to a new, strategic vision for natural risk reduction and CCA, thereby opening new frontiers for research and policymaking. To achieve this goal, the project focuses on three main challenges:

- To create more coherent national and European approaches on CCA, DRR and resilience strengthening
- To enhance risk management capabilities by bridging the gap between science and legal/policy issues at local and national levels in six European countries
- To improve the management of trans-boundary disasters

Outputs and impact achieved so far:

The main final products of ESPRESSO will be the Guidelines on Risk Management Capability and a Vision Paper on future research strategies in order to better define the research priorities following the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030.

ESPRESSO is currently approaching the completion date of the project, accordingly, the vision paper and the guidelines have now been prepared and sent for external reviewing. Once the external review process is completed, the project team will finalise these and launch the project final products in a stakeholder forum in mid-October. The stakeholder forum will be held in Brussels followed by the final project meeting.

Future tasks:

Finalising the vision paper and the guidelines, Stakeholder forum to launch the final products of the project and the final project meeting, Project Dissemination

Project team (HUD):

Prof. Dilanthi Amaratunga

Prof. Richard Haigh

Dr Nuwan Dias

Georgina Clegg

Project partners:

AMRA Scarl, Italy (coordinator)

Helmholtz-Zentrum Potsdam Deutsches Geoforschungszentrum, Germany

Bureau de Recherches Géologiques et Minières, France

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Deutsches Komitee für Katastrophenvorsorge e.V., Germany

Eidgenössische Technische Hochschule Zürich, Switzerland

University of Huddersfield, UK

Københavns Universitet, Denmark



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700342. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Tsunami interface (A study of the upstream-downstream interface in end-to-end tsunami early warning and mitigation systems)

Outline:

After the 2004 Indian ocean tsunami, preparedness has become a main part of the disaster research and practise. As a result, an end-to-end tsunami early warning and mitigation system (TEWMS) was established in the Indian ocean region and this became fully operational in 2013. A TEWMS typically entails upstream and downstream components; the upstream process is the detection of tsunami wave and communicating the warning to individual countries while the downstream is dissemination of warning decision and evacuation order within the country until all vulnerable communities are safely evacuated. Between the upstream and the downstream, there occurs where the warning received by national tsunami warning centre is processed, decision to evacuate is taken and is the order for evacuation is given. This stage is defined as the 'interface'. In different countries the mechanism of interface varies depending on the local conditions including social, political, geographical and administrative circumstances. Due to the complex nature of different administrative systems, it is difficult to understand who takes the decision to evacuate, at which point, and how is it taken and disseminated to the community. The decision can be taken either at the national level or regional level, and the means by which the information is shared and the structure of hierarchy of decision making differ significantly across and within the countries. This study aims to understand the technical, legal and socio-cultural complexities that occur at the interface between upstream and downstream mechanisms of the tsunami early warning system. This interface involves a wide array of jurisdictional agencies and response partners, including regional tsunami service providers, tsunami national contact points, and a range of sub-national emergency operational centres and related actors. Using the cases of Indonesia and Sri Lanka, the study based on which this abstract is based, aims to develop a framework to understand the nature and operation of interface between the upstream warning and downstream threat, and thereby propose a set of practical guidelines for better decision making and information dissemination during the interface of end-to-end tsunami early warning and mitigation system in the Indian ocean region. The final guidelines established by the study will seek to be a strong theoretical and practical contribution that can be applied across the globe in different types of early warning systems related to tsunami preparedness.

Outputs and impact achieved so far:

The research outputs generated and in preparation under the project are listed below.

- The paper titled "a study of the upstream-downstream interface in end-to-end tsunami early warning and mitigation systems" accepted for publication and to be published under ICDM, 2018 conference proceedings
- A paper to be published is under preparation on the downstream mechanism of interface in Sri Lanka, and to be submitted to the international journal of disaster reduction by August 2018
- The next journal paper will focus on the case of interface mechanism in Indonesia, and to be completed by September 2018

Below is a list of research presentations given.

- Research presentation at international conference on disaster management (ICDM) 2018, on May 2-4 2018 in Padang Indonesia; The literature review and conceptual framework of the study was presented titled "a study of the upstream-downstream interface in end-to-end tsunami early warning and mitigation systems"

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- An abstract was accepted to be presented at the 8th international conference on building resilience (ICBR) 2018, on November 14-16, 2018 in Lisbon, Portugal. The presentation is titled as “A study of the upstream-downstream interface in end-to-end tsunami early warning and mitigation systems: the analysis of downstream in Sri Lanka”

Research impact generated

- As a result of the focus group discussions that took place in both Sri Lanka in Indonesia, the stakeholders of the tsunami early warning systems in both countries came to a single table for an honest discussion about the gaps and issues of the system for the first time. While contributing to the study, these discussions have paved way for much clarity and understanding among the different stakeholders from different institutions
- During the interim evaluation meeting of the project. It was revealed that the tsunami bulletins followed by Sri Lanka had not been updated since 2012. The relevant stakeholders were informed and steps were taken to update the tsunami bulletins that should be followed in case of an emergency
- As a result of 2 studies carried out in Sri Lanka, one of the proposed recommendations was to develop a synergized SOP that set up the guidelines for the system as a whole, taking into consideration all key actors, decisions and action points. This also can clarify the roles and responsibility of each actor, and ensure accuracy and consistency. This was taken forward by the Sri Lankan team, and two workshops were conducted so far to draft and develop an integrated SOP. The SOP will be further developed and validated before introducing to all stakeholders in the near future.

Future tasks:

- Complete journal publications
 - Downstream mechanism in Sri Lanka – to be submitted to international journal of disaster reduction
 - Interface mechanism in Sri Lanka
 - Interface mechanism in Indonesia
 - Policy brief paper highlighting the findings from Sri Lanka
- Future conference presentations
 - Presentation at ICBR 2018 in Lisbon in November, 2018, on Downstream in Sri Lanka
 - Present the findings at ASCENT conference in Colombo, Sri Lanka, in January 2019
 - A conference paper to be planned on findings from Indonesia
- Extend the study to other countries with a multi-hazard perspective
 - Literature review in preparation on Multi-Hazard Early Warning Systems in establishing a common understanding and terminology, and developing a conceptual framework on coastal multi hazards

Project team:

University of Huddersfield, UK

- Prof. Dilanthi Amaratunga
- Prof Richard Haigh
- Maheshika M. Sakalasuriya

Book of Abstracts

Indonesia


- Dr. Harkunti P. Rahayu, Bandung Institute of Technology

Sri Lanka

- Prof. Siri Hettige, Centre for Development Research & Interventions
- Dr. Senaka Basnayake, Asian Disaster Preparedness Centre
- Namal Weerasena, Centre for Development Research & Interventions

Project partners:

- Global Disaster Resilience Centre, University of Huddersfield, UK
- Bandung Institute of Technology, Indonesia
- Centre for Development Research & Interventions, Sri Lanka
- Asian Disaster Preparedness Centre, Thailand



ASCENT (Advancing Skill Creation to ENhance Transformation)

Outline:

ASCENT (Advancing Skill Creation to ENhance Transformation), a project funded by the European Union. ASCENT is co-funded by an EU Erasmus+ programme grant, will run for three years commencing from 1st February 2016 and is led by Professor Dilanthi Amaratunga and Richard Haigh from the University of Huddersfield's Global Disaster Resilience Centre, based in the UK. They are joined by a consortium of 13 European and Asian higher education institutions from the Bangladesh, Estonia, Lithuania, Sri Lanka, Sweden, Thailand and the UK.

ASCENT aims to address R&I capacity strengthening for the development of societal resilience to disasters - supporting training, skills, leadership development, international collaboration and university-industry partnerships. It will strengthen the ability of partner HEIs to respond to their research needs in disaster resilience. ASCENT will be empowering individuals and organisations with the skills, competencies and credentials needed to continue to pursue research, and to lead research at institutions in partner countries, aimed at reducing the impact of disasters. It will enhance the capacities of the partner HEIs in Asia to meet (match) the challenges and specific needs that characterize with R&I within the context of disaster resilience.

ASCENT will achieve this aim by:

- 1) Identifying research and innovative capacity needs across partner country HEIs to tackle the development of societal resilience to disasters;
- 2) Developing research infrastructure to support implementation of the project and provide sustainable capacity development within the partner HEIs ;
- 3) Preparing researchers in the identified Asian countries to undertake advanced, world-class and innovative, multi- and inter-disciplinary research that will contribute to increased societal resilience to disasters;
- 4) Increasing international cooperation by partners HEIs on research programmes that tackle ways to increase societal resilience to disasters;
- 5) Exploring, promoting and initiating opportunities for fruitful university / industry partnerships to increase societal resilience to disasters; and
- 6) Publicising the project progress, successes and outcomes as far as possible, and raising awareness across the field of HE about capacity building for disaster resilience research.

In this context, over the three years, the ASCENT consortium will identify research and innovative capacity needs across Asian higher education institutions in Bangladesh, Sri Lanka and Thailand to tackle the development of societal resilience to disasters. It will develop research infrastructure, prepare researchers to undertake advanced, world-class and innovative, multi- and inter-disciplinary research, and increase international cooperation among higher education. It will also explore, promote and initiate opportunities for fruitful university / industry partnerships. In doing so, ASCENT will provide the link between the research and the public, helping to reinforce the connection between education and society.

Outputs and impact achieved so far:

- A research and innovative capacities development framework consisting of Capacity dimensions, index and indices based on an adapted Box Model

Book of Abstracts

- ASCENT capacity dimensions model, index and indices
- Undertake R&I capacity baseline survey
- Undertake national level (in Bangladesh, Sri Lanka and Thailand) analyses for research and innovative capacities in disaster resilience
- Detailed Baseline Survey Analysis Report
- Three national level capacity analyses
- 08 Institutional reports by the Partner Institutions based on Institutional level interviews with Management, Academic and Research Staff.
- 03 National Position Papers (NPP) by the 03 Partner Countries based on the Institutional reports and based on National level interviews with Policy makers and Directors/Managers in University Authorities.
- Large number of journal and peer reviewed conference papers
- 6 news letters
- Project web site
- Develop functional and technical specification of the virtual research training platform
- Develop and implement virtual research training platform
- Develop manual for virtual research training platform
- Design, develop and appropriate MOOCs
- Research methods training workshops
- Research methods online workshops
- Exercise on policy brief and sustainability plan development
- Deliver online supplementary research skills training workshops
- Develop action plan and international cooperation training programme
- Deliver international cooperation training workshops
- A university - industry strategy
- University - industry training events

Future tasks:

- Host a policy dialog with key stakeholders
- Further online training on identified topics
- Research methods workshops
- Supplementary research skills training online workshops –
- specific policy brief based on the international cooperation
- report and paper based on the latest international cooperation
- a special session on international cooperation at the final ASCENT meeting to be held in Colombo, Sri Lanka in Jan 2019
- policy brief on university industry partnerships

Project team:

- Prof Dilanthi Amaratunga
- Prof Richard Haigh

Project partners:

- Programme Countries (Europe)
- University of Huddersfield, United Kingdom (Lead Partner)
- University of Central Lancashire, United Kingdom

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- Lund University, Sweden
- Tallinn University of Technology, Estonia
- Mid-Sweden University, Sweden

Partner Countries (Asia)

- University of Moratuwa, Sri Lanka
- University of Colombo, Sri Lanka
- University of Ruhuna, Sri Lanka
- University of Naresuan, Thailand
- Chiang Mai University, Thailand
- University of Dhaka, Bangladesh
- BRAC University, Bangladesh
- Patuakhali Science and Technology University, Bangladesh

Co-funded by the
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CABARET (Capacity Building in Asia for Resilience EducaTion)

Outline:

A new project funded by the European Union aims to strengthen research and innovation capacity for the development of societal resilience to disasters. The project, called CABARET (Capacity Building in Asia for Resilience EducaTion), will provide support to build capacity for international and regional cooperation between Higher Education Institutes (HEIs) in Asia (region 6) and Europe, and among Asian HEIs themselves, to improve multi-hazard early warning (MHEW) and increase disaster resilience among coastal communities. In doing so, CABARET focuses on a subject area and a world region not sufficiently addressed by projects already being funded under previous schemes.

CABARET is co-funded by an EU Erasmus+ programme grant, will run for three years and is led by the University of Huddersfield Global Disaster Resilience Centre, based in the UK. They are joined by a consortium of 15 European and Asian higher education institutions from Bulgaria, Indonesia, Latvia, Maldives, Malta, Myanmar, Philippines, Spain, Sri Lanka and the UK. Further the project works with 3 associate partners of Asian Disaster Preparedness Centre (ADPC), IOC/UNESCO and the Federation of the Local Governments Association in Sri Lanka.

Over three years, the CABARET consortium will identify research and innovative capacity needs across Asian higher education institutions in Indonesia, Maldives, Myanmar, Philippine and Sri Lanka to built capacity to broaden early warning to provide a comprehensive, multi-hazard framework.

Outputs and impact achieved so far:

- 5 National Position Papers were produced by HEIs in Asia: Sri Lanka, Myanmar, Philippines, Maldives and Indonesia
- Initial regional capacity framework was formed based on the literature review
- Final regional capacity framework was developed
- Conduct a regional survey
- Drafted a Regional Position Paper
- Convened project Kick-off meeting in Sri-Lanka, Second Steering Committee Meeting in Spain and Third Second Steering Committee in Sri Lanka
- 3 E-newsletters produced
- Launched project website <http://cabaret.buildresilience.org/>
- Establishment of a regional innovation hub
- Conducted seven sandpit proposals
- Conducted innovation training workshop in Kandy, Sri Lanka in March 2018

Future tasks:

- Enhanced regional and transboundary cooperation for multi-hazard early warning
- Empowered individuals and organisations with the skills, competencies and credentials needed to promote and sustain regional cooperation aimed at reducing the likelihood and impact of disasters in coastal communities
- Enhanced capacities of the partner HEIs in Asia to meet (match) the challenges and specific needs of the wider economic and social environment

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- Strengthened internationalisation of HEIs and their capacity to network effectively in research, scientific and technological innovation
- Exchange of experience and practice in spite of diversity, and increased ability of partner HEIs in Asia to build relationships with relevant socio-economic actors
- Improved skill (knowledge, qualifications,) acquisition for professional teams involved in multi-hazard early warning
- Will be convened Fourth Steering Committee Meeting in Myanmar
- Preparation for use of Moodle to be incorporated in the capacity building platform

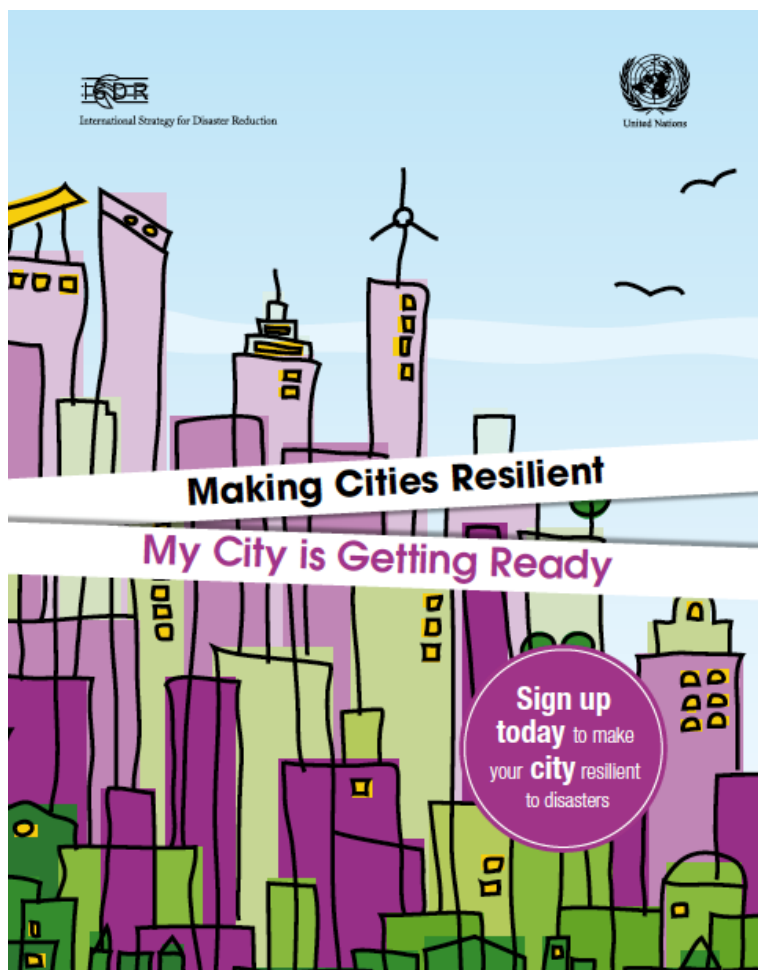
Project team:

- Prof Richard Haigh
- Prof Dilanthi Amaratunga
- Ms Kinkini Hemachandra

Project partners:

- University of Huddersfield: <https://www.hud.ac.uk/>
- University of Central Lancashire: <http://www.uclan.ac.uk/>
- University of Cantabria: <http://web.unican.es/>
- University of Mining and Geology: <http://www.mgu.bg>
- University of Malta: <https://www.um.edu.mt/>
- Riga Technical University: <https://www.rtu.lv/en>
- University of Moratuwa: <http://www.mrt.ac.lk/web/>
- University of Peradeniya <http://www.pdn.ac.lk/>
- Bandung Technical Institute: <https://www.itb.ac.id/>
- Andalas University: <http://www.unand.ac.id/id/>
- Maldives National University: <http://mnu.edu.mv/>
- De La Salle University: <http://www.dlsu.edu.ph/>
- Ateneo De Manila University: <http://www.ateneo.edu/>
- Mandalay Technological University <http://mtu.moe-st.gov.mm/>
- University of Yangon <http://uy.edu.mm/>

Making Cities Resilient: My City is Getting Ready



Background

Mayors and local governments are both key targets and key drivers in building urban resilient. First, local governments benefit from urban risk reduction, as they are responsible for developing effective policies and tools in helping cities to get ready to meet future risks and to ensure development goals. Urban risk reduction therefore offers opportunities for attracting capital investments, creating fresh business possibilities, delivering greater social equality and providing more balanced ecosystems. Second, local governments hold key positions in successfully integrating disaster resilient into urban development planning processes and daily city operations, as they provide leadership for the well-being of their constituencies. They are also the closest institutional level to citizens and communities. Thus, their participation and leadership are vital to any commitments to implement disaster risk reduction.

What is the “Making Cities Resilient Campaign”?

The United Nations Office for Disaster Risk Reduction (UNISDR) and its partners are working towards sustainable urbanization by taking proactive actions. The Making Cities Resilient Campaign (MCRC) - launched in May 2010 - addresses issues of local governance and urban risk. The Campaign is led by the

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UNISDR but is self-motivating, partnership and city-driven with an aim to raise the profile of resilience and disaster risk reduction among local governments and urban communities worldwide.

The objectives of the Making Cities Resilient Campaign:

- Know More: Raise awareness of citizens and governments at all levels of the benefits of reducing urban risks.
- Invest Wisely: Identify budget allocations within local government funding plans to invest in disaster risk reduction activities.
- Build more safely: Include disaster risk reduction on participatory urban development planning processes and protect critical infrastructure

Since its launch in May 2010, the Making Cities Resilient Campaign had served as a means to support the implementation of the Hyogo Framework for Action (HFA), 2005-2015, at the local level.

Making cities more resilient: Everyone has a role to play

What makes a city resilient to disasters can be seen as a combination of resilience accumulated through the process of urbanization and planning on one hand, and the result of specific actions to reduce disaster risk by various actors on the other. National governments, local government associations, international/regional/non-governmental organizations, community associations, donors, private sector, academia and citizens all can be engaged in the process of urban disaster risk reduction, where specific actions are taken to identify, manage and lessen the influences of natural and human-induced hazards.

2010-2015: What has been achieved?

The first phase of the Campaign focused on raising awareness and advocacy. Since being launched, the Campaign has strengthened local level leadership and increased political will for disaster risk reduction.

“The Resilient Cities Campaign has helped us and other Cities in sharing our views towards the HFA 2, which we believe will be the most significant international instrument for accelerating local resilience.”

(Baltazar S. Tribunalo Jr., Head - Provincial Disaster Risk Reduction and Management Office, Cebu Province, Philippines)

The Campaign has produced several tools to help local leaders assess, monitor, document and improve their disaster risk reduction activities: namely, the “Ten Essentials” for Making Cities Resilient Checklist, the HFA Local Government Self-Assessment Tool (LG-SAT) and the Handbook for Local Government Leaders on How to Make Cities More Resilient. To date, 650 local governments have conducted self- assessments using the LG-SAT, with 334 cities having used these as the basis for creating or adapting urban development plans and taking decisions.

The Campaign has also engaged in a wide range of meetings and technical support activities with city leaders, both internationally and regionally. In 2014 alone, 800 local officials from participating cities of the Campaign and disaster managers from 36 countries were trained by the UNISDR’s Global Education Training Institute to support efforts to put into practice the Ten Essentials for Making Cities Resilient.

2016-2020: Priority for action

As of October 2017, the Campaign works with over 3707 cities globally, ranging from major cities such as Mumbai and Cape Town to small towns in Austria, Chile, Pakistan and beyond. The Campaign also works to develop a global network of local governments committed to reducing risk, building more resilient cities and promoting city-to-city learning exchanges and increased cooperation.

Building on the HFA, the Making Cities Resilient Campaign will now carry on through to 2020, supporting the implementation of the Sendai Framework for Disaster Risk Reduction (2015-2030) at the local level, with its seven targets and four priorities for action.

The second phase since starting in 2016 is dedicated to implementation. The campaign aims to ensure that the commitments made by governments are integrated into the local context. Serving as a means for realizing the Sendai Framework, Sustainable Development Goals (SDGs), the New Urban Agenda and other 2030 Development Agenda, the Campaign has shifted its focus to implementation support, partner engagement, investment-cooperation opportunities, local action planning and monitoring of progress.

In particular, the Campaign will continue to advocate for the widespread commitment by local governments to build resilience to disasters, aiming to reach 5,000 city-local government participants by 2020. In addition to this aim, the campaign has a goal of supporting 500 cities create their local disaster risk reduction and resilience strategies. Furthermore, a standardized approach to resilience - the checklist of the Ten Essentials for Making Cities Resilient and their indicators - as well as a corresponding reporting process will be made available and applicable to all cities to measure and monitor their resilience from early 2017.

More so, private sector partners are increasingly being targeted as well as connected with local governments and other development partners, to actively contribute to the development of products and services, tools and technical support, towards innovative urban risk reduction solutions.

GUIDANCE DOCUMENTS

THE TEN ESSENTIALS - An operational framework of Sendai Framework at local level



The Ten Essentials for Making Cities Resilient are developed with the launch of the Campaign in order to accelerate implementation of the Sendai Framework for Disaster Risk Reduction (2015-2030) at local level. The ten Essentials map directly against the Sendai priorities of action and its indicators for monitoring actions on disaster risk reduction. They are the critical and independent steps that need to be undertaken to build and

maintain resilience. This document provides the rationale for each Essential, pointing out strategic areas of intervention and identifying key actions.

The actions identified under each Essential should be part of the overall disaster risk reduction planning process and influence urban development planning and design.

For further details, please visit:

<https://www.unisdr.org/campaign/resilientcities/home/toolkitblkitem/?id=1>

A HANDBOOK FOR LOCAL GOVERNMENT LEADERS [2017 Edition]

A contribution to the Global Campaign 2010-2020. Making Cities Resilient – “My City is Getting Ready!”

Since the first edition of this Handbook, local governments all over the world have come up with concrete ways to reduce disaster risk and boost resilience. With the adoption of the Sendai Framework for Disaster Risk Reduction in 2015, the campaign Making Cities Resilient: "My City is Getting Ready!" has entered a new phase and has shifted its focus towards more implementation support, city-to-city learning and cooperation, local action planning and the monitoring of progress in cities.



How To Make Cities More Resilient A Handbook For Local Government Leaders

A contribution to the Global Campaign 2010-2020
Making Cities Resilient – “My City is Getting Ready!”



What is a Resilient City?

Based on the new Ten Essentials for Making Cities Resilient, a Resilient City is described as one, where:

1. There is strong leadership and coordination and responsibilities in disaster risk management are clearly delineated. This includes effective stakeholder engagement, well defined policies and strategies and distribution of tasks, effective lines of communication and mechanisms that facilitate effective risk management.
2. The city is up-to-date on knowledge about hazards. Risk assessments are routinely prepared as a basis for urban planning and long-term development, including current and future investment decisions that contribute to improved resilience.
3. There is an adequate financial plan that complements and promotes mechanisms to support resilience activities.
4. Urban planning is carried out based on up-to-date risk information with a focus on the most vulnerable groups. Realistic and risk compliant building regulations are applied and enforced to effectively reduce physical risk.
5. Natural ecosystems within and around the city's territory are identified, protected and monitored to sustain and safeguard their protective functions as natural buffers.
6. All institutions relevant to a city's resilience are strengthened to have the capabilities they need to execute their roles.
7. The social connectedness and culture of mutual help are strengthened through community, education, and multi-media channels of communication.
8. There is a strategy to protect, update and maintain critical infrastructure to ensure that services continue and to increase resilience against hazards and the impacts of climate change.
9. Effective disaster response is ensured by creating and regularly updating preparedness plans, connecting to early warning systems and increasing emergency and management capacities through public preparedness drills.

10. Post-disaster recovery, rehabilitation, and reconstruction strategies are aligned with long term planning and provide an improved city environment after disaster events.

Align to that, this second edition of the Handbook responds to the call for better access to information, knowledge resources, and tools to effectively deal with the impacts of natural hazards and climate change. It provides an overview of key strategies and actions as part of an overall sustainable urban development strategy. This Handbook contains: an introductory part; the main body elaborating on the rationale for investing in disaster risk reduction (DRR) and resilience; the New Ten Essentials for Making Cities Resilient; the five steps to develop a process called the Resilience Building Cycle; and annexes containing useful resources for Handbook users, besides of several practical examples that illustrate how local governments, together with stakeholders and partners, are able to achieve resilience.

The handbook can be downloaded from:

<http://www.unisdr.org/campaign/resilientcities/home/toolkitblkitem/?id=2>

QUICK RISK ESTIMATION (QRE)

A tool to identifying and understanding current and future risks / stress / shocks and exposure threats to both human and physical assets.



The Quick Risk Estimation (QRE) tool has been designed for the purposes of identifying and understanding current and future risks / stress / shocks and exposure threats to both human and physical assets. The QRE Tool is not a full- scale risk assessment, rather a multi-stakeholder engagement process to establish a common understanding. Taking into account the actions or corrective measures already undertaken, the QRE will produce a dashboard- style risk assessment advising the risks and hazards to human and physical assets, impacts of identified main risks and associated perils on the specified location and/or particular asset.

Reduction (UNISDR). The hazard indicators included in the QRE tool are aligned to the 10 Essentials for Making Cities Resilient Scorecard in the context of the Sendai Framework for Disaster Risk Reduction 2015 - 2030 and the Sustainable Development Goals.

Further details on this is available at:

<http://www.unisdr.org/campaign/resilientcities/home/toolkitblkitem/?id=3>

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ASSESSMENT TOOLS

Disaster Resilience Scorecard for Cities

A tool for disaster resilience planning.



United Nations Office for Disaster Risk Reduction with the support of European Commission, IBM, AECOM and other partners and cities participating in the Making Cities Resilient Campaign have updated the Disaster Resilience Scorecard for Cities.

The Scorecard provides a set of assessments that will allow local governments to monitor and review progress and challenges in the implementation of the Sendai Framework for Disaster Risk Reduction: 2015-2030, and assess their disaster resilience. It is structured around UNISDR's Ten Essentials for Making Cities Resilient.

It offers the potential for scoring at two levels:

- Level 1: Preliminary level, responding to key Sendai Framework targets and indicators, and with some critical sub-questions. This approach is suggested for use in a 1 to 2-day city multi-stakeholder workshop. In total there are 47 questions indicators, each with a 0 – 3 score;
- Level 2: Detailed assessment. This approach is a multi-stakeholder exercise that may take 1 –4 months and can be a basis for a detailed city resilience action plan. The detailed assessment includes 117 indicator criteria, each with a score of 0 – 5.

While the Scorecard can be used as a standalone tool, it does require you to consider your city's hazards and risks. Specifically, the Scorecard prompts you to identify "most probable" and "most severe" risk scenarios for each of your identified city hazards, or for a potential multi-hazard event. In considering risk, you may find the Quick Risk Estimation tool (QRE) developed by UNISDR and Deloitte helpful.

[Note: The Scorecard files cannot be downloaded through the Firefox Browser due to technical incompatibility]

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Addressing extreme heat risks in tropical Asian cities: exploring a systems approach framework for health and well-being

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Climate change and natural disasters are synchronized global issues increasing dramatically over the next several decades. Scientific consensus substantiates the phenomenon of “Warming Earth Climates” for majority of the countries all over the world [1]. The projected increase in the amplitude of temperature variability is evident for developing countries in tropics and vulnerabilities to weather and climate shocks in economically deprived countries in Asia will increase in future [2].

Asia is one of the fastest growing regions in the world and for next 30 years more than half of the global population will concentrate in developing Asian cities. This trend is not an exception for Sri Lanka as 70% of population is expected to reside in urban settlements by 2030. Fifth Assessment report of the Intergovernmental Panel on Climate Change informs the climatic drivers of warming trend and extreme temperatures indicating high and escalating risk on heat-related mortality in Asia [3]. Thus heat waves and associated heat stress is an emerging climate change induced disaster which will instigate significant public health risk in the burgeoning cities in Asia.

Sendai Framework prioritizes the need for improved understanding of disaster risk in all its dimensions of exposure, vulnerability and hazard characteristics [4]. Extreme heat risks vary among countries due to changes in exposure and vulnerability. Variations in exposure and vulnerabilities to extreme heat risks are influences of close interactions and interdependencies associated amidst built environment, climate change and health. With the frequency of current extreme heat incidences in Sri Lanka, heat stress is an emerging threat on human health and well-being. Although floods and landslides are widely explored disasters a limited research focus is evident for exposure, vulnerability and burden of disease due to extreme heat events.

This study explores an emerging dilemma of existing urbanization in megacities of Colombo and Kandy addressing the issues on urban built-environment, atmospheric pollution and adverse impacts on health. A critical appraisal of relevant policies and national action plans on urban planning, air pollution and health inform barriers and challenges on effective advocacy of evidence based decision making approach. Proposed future research interventions on systems approach facilitate in originating far reaching implications in mitigating climate change induced extreme heat risks on health and well-being.

Key words: Extreme heat, Tropics, Urbanization, Health and Well-being, Built-environment

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Convergence of disaster risk reduction and climate change in the urban agglomerations of Indonesia

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Indonesia has both the fastest urbanisation growth rate and the largest share of urban population globally, rising to 67% by 2025. Urban agglomerations also emit significant and growing amounts of greenhouse gases and Short-lived Climate Pollutants, that contribute to global warming, but also impact public health, food, water.

Coastal urban agglomerations are especially exposed to the impacts of climate change and disaster risks. In the coming decades, climate- induced extreme events are expected to increase. These changes will continue to affect natural and human systems independently or in combination with other determinants to alter the productivity, diversity and functions of many ecosystems and livelihoods. Climate change impacts and variability threaten to exacerbate existing vulnerabilities and further entrench development disparities.

There is increasing recognition that disaster risk reduction should include climate change adaptation. These two perspectives have been developed by different communities, but the aim of both is to reduce vulnerability and hazard exposure in order to increase resilience to the potential adverse impacts of climate extremes. The integration of the two fields provides opportunities to strengthen the common parts and improve the management of present and future hazards and risks.

Despite such potential benefits there remains some significant challenges. They remain distinct fields and collaboration has proven difficult. There are separate communities of working in the two areas, with limited overlap in networks, fora and methods.

This is an account of a comparative study into methodologies and tools used to enhance the integration of DRR and CCA in development processes in the coastal cities of Indonesia. The study considers four key elements that underpin DRR and CCA: Legal Frameworks; Budgeting; Institutional Frameworks; and, Implementation Frameworks.

Key words: urban agglomeration, convergence, disaster risk reduction, climate change adaptation, Indonesia

Dengue: is it a manmade disaster of urbanization

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Dengue fever transmitted by two mosquito vectors; *Aedes aegypti* and *Aedes albopictus* is one of the serious problems affecting the public health in Sri Lanka. The Government of Sri Lanka had to take emergency measures to cope up with epidemic situations to treat the patients and control dengue. The urban centers, mainly man-made structures, served as a permanent breeding ground for *Aedes* mosquitoes. Though the studies provided details on breeding sites of dengue mosquitoes, the literature on quantification of the contribution of various man-made urban structures to the breeding of dengue mosquitoes is not sufficiently established. Hence, this study is an attempt in quantifying the contributing factors to dengue mosquito breeding. One of the objectives of this study was to analyze the impact of urbanization on the outbreak of dengue based on the existing literature. A preliminary review of literature related to urban development and dengue fever from other countries was done.

The main observations from the literature reviewed were as follows. The density of the urban drainage in residential areas influences dengue distribution. The density of the drainage networks in cities should be the least required to prevent both storm water flooding and breeding of mosquitoes in urban areas. Public housing plans should also set directions and guidelines for the control of dengue and other vector borne diseases in human settlements. Dengue fever has been reported to inversely related to vegetation and directly associated to build areas at coarse spatial scales; however, this pattern contradicts when analyzing dengue fever distribution at a local scale within urban environments. Hence, spatial information for dengue prevention and control, and knowledge on how tree cover and other forms of shade-producing vegetation affect vector habitats is important for health officials and urban planners. The interactions between public health officials, urban planners and policy makers who are responsible for urban development seem to be less, which systematically exclude the dengue disease management from mainstream urban planning and governance. It is suggested to integrate health aspects to urban planning in order to make urban areas resilient to dengue outbreaks. This integration could be achieved through the involvement of local government agencies.

Key words: mosquito, breeding, urban environment, urban planning, local government

Public open spaces in cities as an asset to enhance the coastal cities' resilience to tsunamis

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In cities, land is a scarce resource. Therefore, there is an increasing need of identifying the multipurpose uses of available land. The land allocated for public open spaces are considered as an asset for the city with its economic, social and environment benefits. However, apart from these common usages, the use of public open spaces for disaster resilience still remains largely less recognised in urban planning context. Therefore, there is a significant importance of investigating possible uses of public open spaces for disaster resilience. Further, addressing this research need in Tsunami prone coastal cities context is even more important due to the increasing vulnerability of coastal cities as a result of rapid urbanization and growing population in coastal cities. Accordingly, this research study attempts to answer the research question 'How to plan and design public open spaces as a strategy to enhance the coastal cities' resilience to Tsunamis?'. Further, the answer to the research question is focused down to the Sri Lankan context, as Sri Lanka is one of the Tsunami prone countries fronting many challenges such as land scarcity due to the rapid urbanization, challenges to the natural environment and unplanned urban development activities.

The research method of this study is the grounded theory method and the data was collected through unstructured interviews covering different interview groups in Sri Lanka; Tsunami affected communities, disaster resilience experts, urban planners, sociologists, civil engineers and coastal planners. The analysis reveals that there is a significant potential to use public open spaces to enhance the coastal cities' resilience to Tsunamis as an agent of recovery, as a primary place for emergency rescue and for temporary shelters, as a facilitator for Tsunami disaster mitigation and as a mediator to provide Tsunami awareness. Finally, the findings propose a planning and designing framework with spatial and non-spatial factor which can be used to plan and design public open spaces as a strategy to enhance the coastal cities' resilience to Tsunamis.

Key words: Disaster Resilience, public open spaces, sustainable development, urban designing, urban planning

Applicability of Sendai framework for making resilience in Sri Lankan cities

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Sri Lanka is a middle income country which accelerates the development after terminating the 30-year civil conflict. Increment of development projects, industries, career opportunities and infrastructure facilities consolidate people to cities which results urbanization. In 2017, 18.48 % of Sri Lanka's total population lived in urban areas and cities. Rapid urbanization results numerous environmental, social and economic problems in cities such as pollution, waste generation, spacing problems, conflicts, urban heat island effect and etc. Most of the main cities in Sri Lanka are vulnerable to disasters due to these issues of urbanization and their geographical locations (many cities are located along the coastal or flood prone areas) and natural hazardous damage to the people and properties while disturbing to the national development. The local government is focusing on better preventive and controlling practices of the disasters for reducing the disaster risk and damages. The government officially addressed disaster management in the Sri Lanka by disaster management act, No. 13 of 2005. The Sendai framework which has seven main targets and four main priorities has implemented in Sri Lanka as a commencement for reducing the disaster risk from 2015 to 2030 with the cooperation of other countries. Four prioritized areas focused on (i) understanding the disaster risks, (ii) strengthening disaster risk governance to manage disaster risk, (iii) investing in disaster risk reduction for resilience and (iv) enhancing disaster preparedness for effective response and to —Build Back Better in recovery, rehabilitation and reconstruction in Sri Lanka. Sri Lanka develops national targets which are along with Sendai framework to reduce average annual disaster mortality by 50%, average annual affected people by 50%, economic losses in relation to national GDP by 50% and disaster damage to critical infrastructure and disruption of basic services, including health and education facilities at the end of 2030, compared to respective annual values from 2005 to 2015. Sri Lanka develops special policies, management programs, insurance planning, awareness programs, other programs to increase access to multi-hazard early warning systems, disaster risk information and assessments. Disaster Management Centre acts as the foremost contributor for these events. Many national and international organizations such as World Bank, UN, CISN and USGS take partnerships with Sri Lanka to make strong disaster management programs. These preventive and controlling programs attendant to reduce the disaster risk and damages in Sri Lanka while mainly focusing on cities.

Key words: Disaster risk reduction, Hazardous events, Urbanization, Vulnerability

Empowerment of women in disaster preparedness: within Sri Lankan national governance context

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Natural hazards have affected diverse communities differently [1]. More women have been affected in disasters, caused by natural hazards, than men [2-4] due to their specific features [3-7]. Hence, many innovative strategies have been proposed by scholars and practitioners to reduce their vulnerabilities and enhance resilience capacities. Empowerment of women has been recognized as one such strategy by leading international frameworks, to address many issues faced by women specifically in disasters context. However, present status of empowerment of women in disaster risk reduction and resilience strategies is far behind than the expected level [6].

Hence, this study aims to propose a framework which could enhance empowerment of women in disaster preparedness stage. This is because, disaster preparedness has the ability to reduce devastating effects of future disasters [8, 9]. Disaster preparedness directly contribute to making individuals, communities, governments, cities, nations and regions more resilient [8]. Despite its importance, disaster preparedness has gained less attention specially due to uncertainty of occurrence of future disasters and difficulty of measuring benefits of preparedness [10].

The study is a part of a PhD thesis. This study has been carried out in Sri Lanka since Sri Lanka is frequently affected by many types of natural hazards. Initial data were collected by conducting interviews with experts in the field of disaster risk reduction and resilience. Study results revealed many shortfalls within national governance disaster preparedness stage in Sri Lanka. Even though well documented disaster preparedness plans are available at national, district and divisional level, there are many weaknesses. Lack/ inadequate evaluations of existing plans, lack of continuity of existing plans, limited infrastructures, lack of expertise, limited active participation of stakeholders are the main limitations in present preparedness strategies in Sri Lanka. The study further revealed the factors that affect empowerment of women in disaster preparedness as: experience, self-interest, rules and regulations, supportive infrastructure, resources, organizational culture, family support, patriarchal culture, role model and motivation.

Key words: empowerment of women, disaster preparedness, Sri Lanka, natural hazards

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Political ecological analysis of solid waste disposal in Sri Lanka

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The solid waste crisis is one of the leading and threatening socio-environmental and political problem in Sri Lanka. The technical and engineering aspects of solid waste management are still dominating in this field by ignoring the real socio-political ground in Sri Lanka (Mahees, 2011). Sri Lankans generate approximately 0.62 kg of solid waste per day on average. The total solid waste generation of Sri Lanka is from 8000 to 15000 metric tons per day and average garbage production is around 4.5 million metric tons per year. However, it is only around 40% solid waste collected by local authorities from the average production of 12400 metric tons per day (Bandara, 2008). The entire processes of solid waste disposal or management have become political scenario. The recent landslide of Meethotamulla solid waste dumping site (2017) which caused 32 deaths with 8 more missing, and affected a total of 1,765 is a very good example for politicization of solid waste management in Sri Lanka. The main objective of this paper is to critically examine the role of political ecology in solid waste disposal in Sri Lankan cities. This paper is based on the sociological review of relevant literature and content analysis of newspaper articles.

Political ecology refers to the social relations, access to and control over resources and power to control institutions and political involvement of technical solutions in terms of natural resources and environmental problems (Bryant and Bailey, 1997). Solid waste management remains complicated unsolved issue due to political ecological problem among the political bodies such as central government, provincial councils and local authority. Li and Reuveny (2006) found that there is a correlation between democracy and environmental problems. In Sri Lanka, the patron-client based democracy and informal urban political mechanism have aggravated the unsustainable municipal solid waste management. The bribery and corruption under the soft state condition and the hidden function of political economy in the context of urban political ecology worsen the crisis of solid waste in Sri Lanka.

Key words: Political Ecology, Waste Crisis & Hidden Urban Political Economy

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Oil, migration and urbanisation in the Niger Delta region of Nigeria

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The rate of the urbanisation of most countries of the world has been unprecedented much more than it was prior to the twenty first century. Statistically, studies demonstrate that over 50% of the world's population reside in the cities, and by projection it will increase further to over 60% by 2050. This is phenomenal, making it easy to believe that the world has reached its urban age– an age with greater number of its population residing in the cities. While the urban age thesis is a widely accepted expression used in explaining the rapid rate of urbanisation, there is no consensus as to what drives the high rate of urbanisation occurring especially in most oil-rich developing countries like Nigeria and its Niger Delta region. Most scholars argue that oil is a catalyst for migration and urbanisation taking place in some of these oil-rich developing countries. With this line of argument, oil resource rather than economic development provides a more compelling explanation for the urbanisation occurring in these countries, no wonder it is bedevilled with numerous challenges. While considerable literature on the urbanisation of the Niger Delta region has continued to explore these challenges and possible ways to alleviate them, little or no study has explored the opportunities it presents and how to use them as a transformative tool for development. This is important because most studies especially the New Urban Age while acknowledging the numerous challenges of urbanisation, stress the need for countries to take advantage of the opportunities of urbanisation for economic development. Thus, a paradigm shifts from thinking of the challenges of urbanisation to harnessing its opportunities for development. Therefore, the aim of this study is to identify the opportunities embedded in migration induced rapid urbanisation and to explore how to use such opportunities for the development of the region. This is a qualitative research design which will employ the use of interviews and focus group discussion to generate the data that will help to answer the research questions it posed.

Key words: Oil, migration, urbanisation, development, Niger Delta region.

Making disaster resilient built environments within cities: role of the local government

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The world is experiencing rapid urban growth with a consequential increase in urban poverty. The excessive unplanned urban growth leads to various physical, social and economic vulnerabilities. Consequently, the impacts of disasters are highly detrimental when they occur in urban environments. It is therefore important to safeguard the urban cities by increasing the city's resilience to disasters. A large number of stakeholders are required to get involved in the process of making cities resilient and the local governments have to play an essential role as they are the main governing body in every city. Even though there is a growing concern among researchers and practitioners regarding the required lead role of local government in making cities resilient, several incidents have been reported on the inadequate contribution of local governments in implementing disaster risk reduction initiatives. In this context, this research aims to investigate the role of local governments in promoting disaster resilient cities within the context of the built environment. The roles were first identified through the literature review. The roles were then empirically investigated via expert interviews and case studies by selecting three cities in Sri Lanka which are potentially vulnerable to disasters.

The expert interviews revealed that the local government has a crucial role to play in creating a disaster resilient built environment within cities. Local government is responsible for providing planning permissions and Certificates of Conformity which confirm that buildings are constructed in accordance with the approved plans. Therefore, it was evident that they have an invaluable role to play in promoting a disaster resilient built environment through this exercise. However, it was understood that local governments are hardly engaged in the pre-disaster risk reduction activities; they are more involved in post disaster response. Their contribution to disaster response was observed and it was noted that local governments are the first to help disaster victims by providing resources, such as manpower and machinery, and coordinating activities during the disaster response period. Within this context, 8 of the 10 experts interviewed were of the opinion that local governments are not adequately engaged in building a disaster resilient built environment within the city. The case studies also revealed similar results; that the local governments from all three cities studied have little engagement in pre-disaster protection and only provided a supporting role to the Disaster Management District Coordinating Office and to the Divisional Secretariats in disaster response missions.

However, based on the case study analysis, 5 key roles and a number of associated sub-roles were identified in which local governments could undertake to create a disaster resilient built environment within cities. The five broader areas identified are: to regulate disaster resilient development by strengthening the planning permission process; regular monitoring and supervision of the city's built environment to ensure continuous resilience to disasters; systematic and coordinated action on unauthorised and disaster prone structures; upgrade, strengthen and maintain essential infrastructure and irrigation systems to ensure resilience; and improve service delivery.

Key words: Local government, Cities, Built environment, Disaster resilience

Making Colombo resilient by investing in relocation as a flood risk reduction strategy: how local governments can assist to make relocation a success

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The Colombo city is located in the western region of the Kelani River basin, which has the country's highest population growth, as well as the highest GDP rates and in addition, it hosts most of the large scale multi-million-dollar development activities. Each year with the torrential monsoon rains, the Colombo city and its peripheral cities gets flooded disrupting the economic activities and causing damages worth millions (Hettiarachi et al. 2014). This situation leads to the identification of multiple mitigation and prevention measures and the implementation of multiple flood management projects in the Kelani River basin (Jayawardane, 2006). Climate Resilience Improvement Project (CRIP) is one such effort funded by the World Bank, which encompasses the prospects identified in the third priority area of the Sendai Framework for action; investing in disaster risk reduction for resilience. One of the objectives of the second phase of the project is to reduce exposure of people living in both sides of the Kelani River bank from the river's estuary to Hanwella to floods, by implementing mitigation strategies as construction of flood walls, pumping stations etc.; on reclaimed lands which are within 50 meters to the river banks. Land reclamations of this scale would result in the relocation of a considerable number of families, majority of whom are deprived and are suffering from multiple sources of socio-economic vulnerabilities.

This particular presentation makes an attempt to identify how the local governments can assist these deprived families to be secure after the relocation, by grounding itself on the findings of focus group interviews conducted with government officials (including local government officials) responsible for the relocation process. The results stresses the need for an integrated approach for relocation, where all the key stakeholders, including the respective local government/s are actively participating in the relocation process from the initial stages. With their expertise, officials of the local governments can contribute in the selecting relocation sites, giving technical support when constructing houses and monitoring (donor build or self-help), providing services including proper access roads, street lighting, garbage disposal and waste water management systems etc. and make the relocation successful and sustainable in the long run.

Key words: Floods, Relocation, Local government, Vulnerability reduction

Institutional roles in building community resilience in urban and peri urban ecosystems: a case study in Ruhuna basin by the Ruhuna Faculty of Agriculture, Sri Lanka

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Disaster Resilience building through ecosystems restoration in Urban and Peri urban areas ([1], [2]) inspired by the Sendai Framework for Action 2015-2030. Even though Sendai Framework recognises it as primary role of state but it should be shared with other stakeholders such as local government, the private sector and other stakeholder Institutions including national and local authorities, community's businesses as well [3].

The community restoration and resilience building programs, initiated by the Ruhuna Faculty of Agriculture for technology incorporation with number of International corporation projects after 2004 Tsunami (Ruhuna CIDA (Canada) Karlsruhe-Ruhuna German Corporation project, NSF (US), AusAID ADPC and European Union funded projects like ASCENT addressed the prioritized area to play the Institutional role ([2], [4], [5]). The societal risks linked to population pressure on river ecosystems also addressed through community awareness programs ([2], [4], [5], [6]). The studies revealed that both grey and green solutions are to be in place to restore degraded agro ecosystems due to construction of flood protection structures. The Appropriate technologies (Bogas, small wind systems, protected agriculture and hydroponics systems, new technology adaptation for rice farming linked to efficient irrigation systems for water management, mulching for water conservation, agro meteorological models) has observed to be low cost options to restore degraded paddy eco systems ([7], [8], [9], [10], [11]). The experience gathered in urban resilience building through eco systems approach helped the Faculty to introduce a new degree program "Green Technology "[12].

Currently University engages with the development of an international M.Sc. program on Tropical agro ecosystems restoration and University Industry partnerships building with EU partners as an out comes of the ASCENT project.

Key Words: Ecosystem restoration, Appropriate technologies, Resilience building, International cooperation projects.

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Integrating CCA and DRR at the local level: challenges in the United Kingdom

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Climate change is likely to alter the frequency and intensity of hydro-meteorological hazards [1]. This means that in order to reduce disaster risk both now and in the future, it is important to consider climate change adaptation (CCA) alongside disaster risk reduction (DRR), allowing resilience to be built more comprehensively. In fact, it has been suggested that CCA should form part of the DRR agenda [2]. The Sendai Framework for Disaster Risk Reduction [3] sets out targets for the reduction of disaster risk now and in the future, thus integrating CCA and DRR can be seen as contributing to this process.

The Framework also highlights the sharing of responsibility for reducing disaster risk with local government. In the United Kingdom (UK) decentralisation has resulted in local governments being responsible for the management of adaptation [4] and risk reduction [5], however the integration of the two practices is limited. The aim of the study was to identify the reasons why local governments in the UK struggle to integrate CCA and DRR. This study drew upon findings from a project entitled ESPREsO (Enhancing Synergies for Disaster Prevention in the European Union) funded by the European Union Horizon 2020 research and innovation programme. Accordingly, a comprehensive literature review of adaptation and DRR literature was conducted. In addition, twelve interviews were conducted with academics, practitioners and representatives from government agencies working in the field of CCA and/or DRR in the UK.

Through synthesis of the literature and interview responses, the study found that despite the strong legislative background at national level for CCA and DRR, practical implementation is an issue. Local governments often struggle to successfully implement CCA and DRR due to limited resources and lack of funding for example. A lack of public support for climate change and short political cycles means that there is little incentive for local government actors to take action. Despite these challenges there are some examples of positive action, for example in the flood risk management sector, however the contribution to both CCA and DRR is not always explicitly acknowledged. The identification of these issues will allow ways to improve CCA-DRR integration to be found so that local governments can holistically reduce disaster risk and contribute to the goals of the Sendai Framework more successfully.

Key words: Climate change adaptation, disaster risk reduction, local government, Sendai Framework

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A Case study of 2.5 Mw Bio energy power plant's Impact in Nintavur

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Due to intense fuel dependency on energy production in the world, cost of energy is now heavily depends on the prices of fossil fuels. Most of the countries in the world are suffering due to this and Sri Lanka is no exception. It is in this context promotion of biomass, as a renewable source, is so vital to the country. Rice being the staple food of the country as well as the crop with highest land area under cultivation, rice husk (RH) generated in paddy processing was found to have a significant potential in power generation. Paddy Husks the byproduct of Rice which represents approximately 25,000,000 GJ of raw energy content is however not currently harnessed for any useful purpose on a commercial scale. With the advancement of biomass energy technologies, realistically, a good percentage of this energy content could be harvested. In keeping with the above theme, the concept, design, implementation and operation of a 2.5 MW power plant was constructed in Nintavur of eastern coastal region and the power so generated is supplied to the national grid. Bio Energy Solution provides direct employment for over 100 no of locals and 150 individuals indirectly from the vicinity of Nintavur and is helping 120 no of Rice mills to dispose the paddy husks derived in the process of rice milling in an economical beneficial manner. But research area people are continuously opposing this plant because this plant emits pollutant into atmosphere therefore there are taking place environmental pollution, ground water level decreasing and health impacts. According to this problem we have decided to do a research to identify the fact about this current issue. Our future power demand will be increase continuously so; we cannot stop these plant activities. Bio energy is the important needs but we can minimize environmental pollutants. So using Charcoal is a best way to infiltrate polluted air. And just send the emission smoke through a water tank so that soot content in smoke is strapped by the water and after a period of time water can be renewed in the tank. This kind of filtration is done in woodworking industries situated in residential areas.

Key Words: Bio Energy, Power plant, paddy husk, pollutants

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Integrated climate adaptation and risk reduction strategies in coastal urban areas: a policy framework for Nigeria

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Climate change is steadily one of the significant challenges in human endeavour. Suffice that as centres of social - economic, political and technological activities, coastal urban areas play significant roles in the planning and adaptation to climate change and disaster risk management. It is noted that the development of coastal urban areas is synonymous with increasing disaster risks, which has led many countries including Nigeria, in the adoption of the Sendai framework 2015 - 2030. This research aims to develop a policy framework that will serve as foundation for future research and actions to improve convergence. From current and existing literatures, it explores the advantages and disadvantages of convergence at global level, identify divergences, drivers of integration and ascertain the status of integration of strategies in coastal urban areas of Lagos, Nigeria. Presently, minimal efforts exist towards harnessing the benefits, opportunities, greater coherence and coordination within an integrated approach, hence the need for stakeholder's collaboration and capacities of coastal urban communities to disaster risks. It is envisaged that robust policy support, good governance and political commitments are important parameters to consider in addition to local awareness and advocacy programmes.

Key words: Integrated climate adaptation, Risk reduction, Strategies, Coastal urban areas, Nigeria

Urban risk reduction and the 2030 agenda: The Sendai Framework for DRR, the 2030 Agenda for Sustainable Development, Paris Agreement on Climate Change and the New Urban Agenda

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This piece of research aims to review the 169 targets of Sustainable Development Goals, 7 targets of the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) by taking into consideration global goals of the Paris agreement on climate change and the New Urban Agenda (NUA), analysing the SDG targets that have a direct or indirect relation to the risk status of a city. According to Salt (2016), cities are the product of evolution and they are complex, interconnected while adapting to fluctuations made by shocks of various magnitudes. Coherence and mutually reinforcing approaches to implementing the international agreements are among the most valuable supports for strengthening the resilience of cities. Taken together, they urge attention to a wide range of risks facing cities and its communities around the world, guide public and private investments towards greater resilience and push delivery towards maximum impact. For that part, resilience at the city level has become a global priority since the adoption of Sendai Framework for Disaster Risk Reduction 2015-2030 which was adopted by all United Nations Member States in 2015. Its first four targets: to reduce (1) mortality, (2) affected populations, (3) economic losses, and (4) damage to critical infrastructure, also align closely with several targets of the Sustainable development goals. The United Nations General Assembly adopted, on 25 September 2015, the post-2015 development agenda, under the title Transforming Our World: the 2030 Agenda for Sustainable Development (United Nations, 2015b), which intends to renew the commitment toward sustainable development. The 2030 Agenda for Sustainable Development establishes, for this purpose, 17 Goals and 169 targets to be achieved within the next 15 years. When governments agreed to the Paris Agreement on Climate Change in 2015, they also recognized the significance of the Sendai Framework, a global goal on climate adaptation that considers enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change has direct implications for disaster risk. The New Urban Agenda adopted at Habitat III built further commitment for adopting and implementing integrated, age- and gender-responsive policies and plans and ecosystem-based establishing a bridge across the four international frameworks. Various researches, such as Jaroslav et al (2016), Kelman (2015) have highlighted the connectivity, complementarity and challenges, between the SFDRR and the Paris agreement, however there is less clarity on the 169 targets of SDGs and its co-relation with SFDRR targets for an urban environment. This could be achieved by placing SFDRR targets as a marker against each SDG target to identify if there is any impact on the risk proportion of the city.

Key words: Development, Urban Agenda, Disaster risk reduction, Paris Agreement, Sendai Framework, Cities, local government;

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Reducing the landslide risk in the central highlands of Sri Lanka

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Landslides are frequent in the slopes of the Central Highlands of Sri Lanka during the monsoon season. Landslides have caused more than 400 deaths in past two years alone in several districts in the country and have become the most frequent and destructive natural disaster of the recent past. Records show that there is an increasing trend of deaths and impact due to landslides. Therefore, the present study was carried out to investigate the reasons for this trend and to propose strategies to reduce the risk. The main sources used in this study are literature, information and statistics on landslides and current practices and approaches of government authorities.

The instability of the slopes of hilly lands aggravated by moisture and surface runoff during heavy rains is the main cause for landslides. Human contributions for landslides such as land clearing and excavations in the hills, improper cultivation methods, blocking of drainage paths and the impact of large reservoirs have increased the risk of landslides. Further, the study showed that the effects of climate change that caused severe rainfalls than usual in the recent past, increased human settlements in landslide prone areas due to land scarcity and the unwillingness of people to leave their ancestral lands have worsened the situation.

The study recommends that the landslide prone areas should be identified and mapped as soon as possible. Proper regulations and procedures should be made to provide safe lands for people who live in landslide prone areas. Ranking lands based on the level of risk may be helpful in identifying the settlement priority and people should be educated on landslides so that they leave their lands upon landslide warnings. Local governments should strictly follow the regulations and should not allow any new constructions in landslide prone sites. The current mechanisms used to produce landslide early warnings should be improved.

Key words: Landslide risk, disaster risk reduction, local government, climate change, early warning

A framework to empower vulnerable communities affected by oil spill hazards in Nigeria

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While most country of the world suffers natural disasters like earthquake, tsunami, hurricane and tornadoes, Nigeria is faced with technological/ and or man-made disasters with oil spill leading with cumulative impacts on well-being, environment and livelihood. Scholars have frequently accentuated the different incidents of oil spills on vulnerable communities within the Nigerian context with little or no standard structure to rebuild affected communities from the hazards. As such have contributed to social tension, loss of culture through conflicts, violent an agitation for resources control and protest for social and environmental justices.

This research inquires the alternative livelihood of the vulnerable communities of oil spill environmental hazards and explores how the alternative livelihood contributes to the rebuild of the socioeconomic and sociocultural condition of the affected communities. As such, the study extends its exploits to identifying the interventions strategies offered by the oil and gas and the oil spill-related agencies towards community livelihood in rebuilding sustainable resilience socioeconomic and sociocultural development. The study attempt to propose a framework to enhance the empowerment of community affected by cumulative oil spills impacts on livelihood structure, socioeconomic and sociocultural development. By, identifying the possible obstructing factors during interventions and how such factors can be overcome as a means of restraining the gaps in intervention while empowering affected communities.

This study adopts a qualitative method that comprises focused group discussions, interviews, documents and unpublished materials. The case study data of both interview and focus group discussions were collected concurrently between the month of August 2016 to November 2016. The collected data were analysed using template analysis techniques with the aid of Nvivo software, draw. oi to identify the patterns and themes.

The result shows a good number of alternative livelihood system enhancing the sociocultural and socioeconomic conditions of communities affected by oil spill hazards. Even though, it was found that some alternatives are detrimental to the environmental. Majority of the communities of this study reaffirms that the alternatives livelihoods improvised prevents their daily interactions with contaminated areas of land, water and its surrounding.

Key Words: Oil spill, Vulnerability, Community, Alternative Livelihood

Coastal cities in rapid transition: vulnerabilities in human dominated urban ecosystems in coastal regions

A case study in Negombo-Muthurajawela coastal region, Sri Lanka

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Majority of industries (62%) and Tourist infrastructures (70%) are concentrated in coastal areas of the Western province of Sri Lanka where urban growth and development are intensified [1, 2]. resulting environmental stresses and the risks. The present study attempted to identify the changes in the coastal ecosystem, the drivers of changes and risks selecting the Negombo town and Muthurajawela area closer to Katunayake airport in the coastal belt.

The temporal changes of ecosystem for last 54 years have been assessed through land use and land cover studies. The results revealed that, about 28% of the total area has been covered by both deep water and shallow water bodies. Devoid of vegetation cover occurred due to rapid decline of paddy lands, coconut plantations, marshy lands and shrub areas. Built up areas and home gardens have increased while decreasing other land use types. Increasing residential areas [3], unplanned settlements [4], expansion of urban areas [5] increasing industrial activities [5, 6, 7], fisheries, tourism, manufacturing and transport [8], trading and commercial activities [9], agricultural/ aqua cultural activities [10], land reclamation [3, 5, 11] and unauthorized encroachments [2, 4] were major reporting disturbances for natural ecosystems. The changes in hydraulic regime, drainage pattern, and water quality, degradation of aquatic environment, erosion, sedimentation, floods and health issues are identified as the major impacts [4, 7, 9, 12, and 13], Climate change and sea level rise also a considerable issue in this area. Air pollution related mortality and morbidity and increased energy demand for air conditioning was having high consequences in 2010 and the situations will be created severe consequences by 2035 [9].

Key words: Costal cities, Changes of ecosystem and Land use and land cover change

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Necessity of enhancing the role of the local governments in disaster resilience

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Sri Lanka's tropical climate has seen a recent increase in natural disasters, such as floods, tsunami, coastal erosion, droughts, lightning strikes, epidemics, environmental pollution and landslides, all over the country. Various manmade disasters resulted deforestation, indiscriminate coral, sand and gem mining and industrial pollutants. Existing records prove that every two-three years a natural disaster takes place resulting in death and injury, as well as massive damages to property, agriculture, industry, highways and other infrastructure, affecting the day-to-day life of the general public. Predicted climate change also emphasize that cities are highly vulnerable to disaster and all which can negatively impact human settlements, productivity in both city and local areas and service delivery specially for the poor. In order to deal with all types of disasters Sri Lankan government has taken important action both in policy and institutional levels. For instance, Disaster Management Act in 2005 and related institutions such as Disaster Management Centre, National Council for Disaster Management are prominent in national level disaster resilience. It was identified that the partnership of the Local Government Authorities (LGAs) are poor in this process. This study focuses the role of local government in flood-related disaster resilience in urban and rural areas. I have selected two local government institutions in Western Province, in an urban and a rural area, for the pilot project. The Bulathsinhala Pradeshiya Sabha is situated in the flood-prone Kalutara District (the majority of the district was affected by massive floods in 2017). The other sample is Kaduwela Municipal Council (which was severely suffered from floods in 2016). According to the Sandai Framework (SF) for Disaster Risk Reduction of 2015, strengthening disaster risk governance to manage disaster risk at the national, regional and global levels is a priority. In this respect, strengthening and building a strong network with the LGAs, as the SF points out, in order to prevention, mitigation, preparedness, response, recovery and rehabilitation is necessary. In order to achieve this priority, it needs to enhance local government capacities through multiple joint activities with the general public, private sector organizations, civil society organizations, and the grass-root political leadership.

Key words: Local Governance, Disaster Resilience, Sandai Framework

A framework to analyse the consequences of post conflict reconstruction intervention; the case of road infrastructure in Sri Lanka

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After a violent conflict comes to an end, the post conflict reconstruction (PCR) of infrastructure become a major concern of the policy makers and governance institutions. However, there is a lack of understanding in literature about what happens after a reconstruction intervention in the post conflict context. The post conflict context itself is dynamic with loss and trauma, vulnerability, fear, lack of trust, resource scarcity, corroded institutions and risk of returning to conflict. A reconstruction intervention within this context can have different consequences and long term impacts that are not common in ordinary physical constructions. This research aims to understand the ways in which the consequences of PCR interventions can be analysed relating to the specific post conflict dynamics of the context and the long term impacts. In doing so, the road infrastructure reconstruction in Sri Lanka was identified as a suitable case for the study. An initial conceptual framework was developed through literature review, based on which the data collection was carried out in Sri Lanka. the data was coded using N-Vivo and significant findings are drawn related to the consequences of post conflict reconstruction and their long term impacts. The road reconstruction intervention can create not only economic consequences, but also significant changes in livelihoods of people and their social and cultural experiences both in positive and negative directions. The political consequences of reconstruction are significantly different in post conflict context, and can have important links to long term stability and peace if not carefully managed by a sensitive post conflict strategy. The research is focused on developing a framework to understand the different consequences of reconstruction and their linkages to post conflict context, while highlighting the roles of significant actors within the reconstruction process. This framework can be used as a tool in future research and practise of post conflict intervention to improve the sensitivity of reconstruction projects to the potential consequences it can create, so that the negative outcomes can be minimised.

Key words: post conflict intervention, road reconstruction, consequences, Sri Lanka, framework

The city that I love: in the context of greener and safer cities

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When a city becomes a greener and safer city naturally we love that city. Greener cities work towards an environmentally, socially, and economically healthy and resilient habitat for existing population, without compromising the ability of future generations to experience the same. There should be a complete transformation of the existing city to be a lovable city.

The present study is on the transformation of cities to greener cities, and the study was carried out using literature, case studies and past experience. In order to transform a city to a greener city, an action plan is required. The goals of the action plan comprise of the following,

- (a) Green economy: economy that aims at reducing environmental risks and ecological scarcities, and that aims for sustainable development without degrading the environment which increases the number of green jobs and businesses with green operations.
- (b) Climate leadership: committed leadership to achieve targets for sustainability such as all new buildings built to be carbon neutral.
- (c) Green building: processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from planning to design, construction, operation, maintenance, renovation, and demolition.
- (d) Green transportation: sustainable transportation in the senses of social, environmental and climate impacts and the ability to, in the global scope, supply the source energy indefinitely. It reduces driving and makes the majority of trips by foot, bicycle, and public transit traffic.
- (e) Zero waste: philosophy that encourages the redesign of resource life cycles so that all products are reused. The goal is for no trash to be sent to landfills or incinerators. The process recommended is the one similar to the way that resources are reused in nature.
- (f) Access to nature: increased accessibility to green parks, greenways, and other green spaces.
- (g) Lighter footprint: reduced ecological footprint.
- (h) Clean water: increased quality of water and reduced water consumption.
- (i) Clean air: increased quality of air.
- (j) Local food: increased amount of locally grown food.

Keywords: Green cities, safe cities, healthy cities, economy, waste

Disaster waste management (DWM); “a panacea for the development of integrated waste management systems for municipal cities and communities” in Abuja and Lagos Nigeria

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Disasters when caused by either man made or natural causes leave a long trail of human and economic consequences especially with the ever increasing frequencies of natural disasters which has grown three-fold to over 3,900 events from 2005-2014 when compared to the previous over 3,100 events from 1975-1984 (ADB. 2015). Globally, every disaster event no matter its magnitude produces some form of debris or waste which requires specialised attention due to the inherent cocktail-mix of different waste items, termed disaster waste. This waste would need to be cleared before any form of response can be initiated to allow the free flow of movement. In the event where a disaster occurs in an area that prior to the disaster the waste management apparatus was low or non-existent, waste evacuation and management would form a major challenge due to lack of local capacity and management capability amongst others. Disaster waste management (DWM) focuses on the challenges of managing the enormous amount of waste or debris in the aftermath of a disaster. Debris produced by disasters has increasingly become one of the challenging aspects of post disaster response and management.

The waste management challenge in Nigeria like other developing countries, is one that has over the years defied all solutions to date, with a history of non-existent waste management framework, policy and service providers, to indiscriminate dumping of refuse in public areas, on street sides and drainages posing health challenge and flooding due to blocked drains during the wet season characterises the living conditions of most communities in Nigeria. The World Bank and the United Nations (2014), posits that the average global human daily waste generation rate is expected to grow from the current 1.2kg to 1.42 kg per day in the next 15 years.

In 30 years' time Nigeria would be the 3rd most populous nation in the world behind China and India according to the UN 2015 world population prospect. This projection also brings to the fore the need for assertive action to address the volume of waste that this population would produce on a daily basis. Nigeria is estimated to annually generate no less than 63 million tonnes of waste which amounts to 0.45kg/capital/annum, where currently only 30-50% of daily generated waste is collected (NGR draft waste policy 2016).

Keywords: Disaster waste management (DWM), cocktail-mix, population prospect.

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Development of automated 3D model construction modules of existing cities for smart damage prediction of civil structures due to natural disasters

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The planning and development of existing cities are tough tasks for engineers due to an enormous amount of data and information which should be considered and the necessity of integrating a large number of ideas from different viewpoints in a fair manner. At present, Sri Lankan engineers are also facing this challenge with Megapolis concept which is proposed by the government. From the viewpoint of civil engineers, the planning and development process of an existing city should be integrated with safety measurements against natural disasters, such as earthquake, tsunami, high-wind and flood to ensure the safety of the citizens. We need to focus on developing a more rational damage estimation method and the use of the three dimensional (3D) numerical simulation is a candidate [1]. Since a variety of numerical methods of structural analysis is available, construction of an appropriate 3D numerical model is a bottleneck to realize an estimation method based on simulating the natural disasters of various civil structures.

Modeling of the 3D Computer-Aided Design (CAD) model is laborious, when the number of structures and structural components being analysed is huge in a target city. The development of automated model construction, i.e., conversion of digital data (GIS data, AutoCAD data, etc.,) available for a target city to CAD or analysis models is thus required [2, 3]. These analysis models should have the capability to detect a suitable numerical analysis method or a suitable fidelity numerical model and assess the damage for given natural disasters. Then, these results of the numerical simulation can be integrated with 3D CAD models for smart development and planning process of the existing city.

Key words: automated model construction, 3D modeling, large scale numerical simulation, natural disasters

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Higher education institutions, multi hazard early warnings and coastal resilience

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Coastal hazards have been significantly increased with rapid change of climatic conditions across the globe [1]. Asia reports the highest number of coastal hazards during the last couple of decades [2]. To control and minimize devastating results of any hazards, the Sendai Framework for Disaster Risk Reduction has introduced innovative strategies within its four priorities with seven different goals. Its seventh goal is set to substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030 [3]. However, the level of development of multi-hazard early warnings in Asia shows uneven progress across member countries in Asia [4]. Higher education institutions can contribute to coastal resilience through education and awareness, advocacy and research and innovations [5]. The framework has underlined the role of academics and scientific communities in disaster risk reduction and resilience [3]. Many higher education institutions in Asia face many challenges hindering their contribution to develop effective multi-hazard early warning and resilience efforts. Hence, this European Commission funded project aims at building capacities among members of higher education institutions in Asia for an effective coastal resilience. The study has been carried out among 15-member countries in Asia and Europe with key stakeholders. The study conducted a detailed literature review to develop its conceptual framework and develop data collection instruments. Funding limitations, weaker coordination with other institutions/ stakeholders, gaps in knowledge, limited supportive policies and political support, lack of self-interest and awareness, limited information and communication barriers are identified from the survey results as the capacity gaps. Accordingly, the project will conduct trainings among members of higher education institutions and other key stakeholders in Asia as its second stage.

Key words: higher education institutions, multi hazard early warnings, coastal resilience, Asia

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Climate change mitigation options in the built environment; energy and comfort performance of workspaces

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Energy use in the built environment is directly related to approximately 50% of the global greenhouse gas emissions. Office buildings are one of the most energy intensive building typologies, over half of the end use energy in these buildings account for active comfort control [1]. Electricity demand for these building services can be minimized by low energy designs [2]. Energy and comfort performance are inseparable for a high-performance building. Research on energy-related occupant behavior and comfort performance of indoor environments can advocate key stakeholders in the building industry to try less energy intensive non-mainstream measures[3]. This research presents a subjective evaluation of indoor environmental quality (IEQ) under diverse indoor environmental conditions and its impact on comfort performance. The mean score for 17 out of 18 questionnaire items was found to be significantly different for workspaces functioning under different set point temperatures. Examination of statistically significant associations among 18 questionnaire items revealed that various IEQ factors exerted their influence on overall comfort, well-being, and self-assessed productivity differently under these diverse environmental conditions.

Key words: climate change mitigation, indoor environment quality, post-occupancy evaluation

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Assessing of geospatial technologies application in disaster management by local governments for city resilience: identifying disaster risk in the Sendai Framework for Disaster Risk Reduction

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Disaster Management (DM) and Disaster Risk Reduction (DRR) emerged as systematic approaches to reduce the impact of environmental and man-made hazards in the earth system. Most of the Sri Lankan population now live in urban areas and most people are aggregated to the commercial capital of the country. Therefore, urban disasters are growing rapidly and most of the city areas can be identified as higher disaster prone areas. By understanding the geospatial aspect of possible disaster conditions, governments are able to make decisions on better allocation of resources in order to prepare for emergencies and to generally improve the quality of life. Currently, Sri Lankan government has taken several initiatives to reduce disaster vulnerability of cities. However, the problem still persist to continue and the local governments of Sri Lanka are still facing challenges in commonly using of Geospatial data, and conduct an advanced procedure in DRR to build city resilience. This research is aimed to examine the geospatial techniques used by local governments for disaster management and understanding the role of local governments in DRR. The current study have been conducted in three different cities (Colombo, Gampaha and Rathnapura) based on their vulnerability. The methodology mainly focused on collecting primary data from semi-structured interviews. Interviews were conducted with the expertise in local governmental institutions, who are primarily involved with DM sector. The interviews were mainly conducted to pertain the details of knowledge of the DRR and use of Geospatial data for DM in Local Governments. The analysis were carried out using the Thematic Analysis and Ground Theory.

The study revealed that the DM is recognized as the main area of the local government, but their current contribution to DRR is very limited and current situation of geospatial technology usage also seemed to be very limited. In the analysis and interpretation of the data, several factors which influence this situation had been identified; that includes lack of political focus on DRR, human resources, education on DM and limited training opportunities. Also, most of DRR activities and plans seemed to be unpopular in the local government level. Further, there is a gap between the actual and potential usage of geospatial technologies in local governments. Therefore, further utilization of geospatial technologies are needed in local governments for better understand the disaster risk and focus on resilience to fulfill the requirements of the Sendai Framework.

Key Words: DM, DRR, Geospatial Data, Local Governments, Sendai Framework

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The causes of flooding and the preparation of risk mapping of Gal-Oya river basin, in Sri Lanka

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Managing the disaster and risk is the important aspect for the village, city or nation building and to keep the sustainability of the socio-economy of the people. This study is conducted based on the flash flood occurring in the Gal-Oya river basin area due to the heavy rainfall. Often, the flash flood affects the people, living in the drainage area namely agriculture, shelter and etc. Agriculture, being lifeblood and sustenance of the inhabitant in the Gal-Oya river basin is heavily affected due to the flash flood and it leads to the setback of the socio-economy of the people. Approximately, 40102.5 hectare agricultural lands are heavily affected and 33579.6 hectare of home gardens land are moderately affected due to the flash flood in the period of 2010 and 2011. The objective of this study to find out the causes of the flooding and to prepare the risk map for the effect mitigation in the Gal-Oya river basin. In order to achieve the objective, Satellite images (Landsat 2015), toposheet and rainfall data of the Gal-Oya river basin were collected and subjected to the spatial analysis with GIS software. The identified causes of flash flood in the drainage area are: relatively low land areas, improper land use planning, intensified rainfall, vegetation removal and improper drainage network. Based on the causes, the risk map has been prepared considering high, moderate and low risky areas with spatial analysis. To least the impact of the flash flood in the Gal-Oya river basin area, proper mitigation plans have been proposed in this study.

Key words: Disaster, Risk, sustainability, spatial analysis, flash flood, socio-economy