

Institution: University of Huddersfield		
Unit of Assessment: UoA 13		
Title of case study: Informing policy and practice of international organisations, governments and the construction industry on development of disaster resilient buildings and infrastructure		
Period when the underpinning research was undertaken: 1st September 2014 – 31st January 2019		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Dilanthi Amaratunga	Professor of DRR	1 st September 2014 – present
Richard Haigh	Professor of Disaster Resilience	1 st September 2014 – present
Chamindi Malalgoda	RA / Lecturer / Senior Lecturer	15 th December 2014 – present
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Period when the claimed impact occurred: 1st December 2015 – 31st December 2020		
Is this case study continued from a case study submitted in 2014? No		
<p>1. Summary of the impact</p> <p>There have been growing calls for greater engagement of the construction industry in disaster resilience building efforts to help society address increasing levels of disaster risk and growing economic losses from disasters. However, the industry's role and the type of knowledge required by its professionals have not been clearly understood. A research study conducted in Europe, Asia and Oceania, and carried out by the University of Huddersfield, has provided policy recommendations and a deeper understanding of the knowledge gaps among construction professionals that must be addressed to develop more resilient buildings and infrastructure.</p> <p>The research has resulted in <u>significant changes</u> to: policy guidance issued by international organisations on making cities resilient; influenced disaster risk reduction policies, legislation and practices at the city level; changed policy and construction industry practices in Sri Lanka; and influenced professional bodies and increased understanding and awareness/attitudes of disaster risk reduction among construction industry professionals. The <u>extensive reach</u> of the impact extends to: local government officials in over 4000 UN partner cities around the world; policies and legislation for national & local government and the development sector in Sri Lanka; green rating systems used by government and private sector clients in the Sri Lankan construction industry; and, professional bodies globally and professional training of architects, construction managers, quantity surveyors and engineers in the Sri Lankan construction industry. The underpinning research and impact won the UK Universities Association for Lifelong Learning (UALL) International Award for 2018.</p>		
<p>2. Underpinning research</p> <p>The construction sector is of strategic importance, providing buildings and infrastructure that underpin the economy and society. It is now recognised that the construction industry must create resilient infrastructure and buildings to tackle increasing disaster risk caused by growth of population and assets in at-risk areas, and the impacts of climate change on natural hazards.</p> <p>The UN Sendai Framework for Disaster Risk Reduction (SFDRR), endorsed by 187 UN member states in 2015, calls for businesses to integrate DRR into their management practices and promote disaster risk knowledge in professional education and training. Supporting this view, the Royal Institution of Chartered Surveyors (RICS), in 2015, called for, "a massive rethink around how we build up skills across our sector to meet the challenges we are facing" and "while delivering on social needs and managing finite resources". Despite this, the role of the construction industry and the type of knowledge required by its professionals to support disaster resilience building efforts, have not been understood.</p> <p>From 2014 to 2018, Amaratunga and Haigh led a Huddersfield team on a series of EU funded projects [G1, G2] to investigate the role of the construction sector in tackling disaster risk and the competency requirements of construction professionals to support the development of more resilient buildings and infrastructure.</p>		

The fieldwork was conducted in eight countries across Europe, Asia and Oceania. This included over 120 expert interviews in 2015/16 with key built environment stakeholders. It also involved, in 2016, focus groups with local government in Sri Lanka and a UN Office for Disaster Risk Reduction (UNDRR, formerly UNISDR) facilitated 'Words into Action' expert group on construction policy and practice led by Amaratunga and Haigh, including in New Zealand with government, UN, business and professional groups. These were supplemented by desk review of international policies related to disaster resilience, including agreements on DRR, climate change, sustainable development, and urban development. Draft analyses were reviewed in 2016 at the UNDRR Asian Ministerial Conference on DRR in India and Implementing SFDRR at Local Level in Italy. They were also reviewed at meetings with RICS representatives in London in 2016-19 and with Sri Lankan local government in 2017.

In developing the research, a variety of organisations collaborated but their role was always limited to the provision of practical support and to facilitate national and local access for fieldwork with industry, related government agencies and stakeholders. These partners included the UNDRR, RICS, and the Federation of Local Government Authorities in Sri Lanka (FSLGA).

Initial research established the nature of the challenges faced by cities and role of the construction sector and local government in tackling disaster risk. Eight core challenges were identified, including those related to legal frameworks, tools and guidelines, human resources, funding, internal systems and processes, external systems, and community engagement [3.1].

The research led to development of an analytical framework using key built environment stakeholders (local and national governments, construction industry and private sector, research, the third sector and community), stages of the property development lifecycle around the RIBA plan of work, and core dimensions of resilience including social, economic, institutional, environmental, technological [3.2, 3.5]. This novel and innovative framework demonstrated disaster resilience through the products and processes of the built environment.

The research also established 231 skills gaps among construction professionals that are required to strengthen resilience building efforts. The analytical framework was used as the basis for mapping these across the property lifecycle, construction industry stakeholders and resilience dimensions. These were ultimately consolidated to identify thirteen key disaster resilience related knowledge gaps and the associated competency requirements [3.3, 3.4].

In addition, we identified a series of recommendations for key actors in the built environment on how to mainstream disaster resilience into the construction process. These recommendations addressed five key areas: education, policy, practice, research and cross-cutting [3.5, 3.6].

3.2 received the Best Paper Award at the 2016 CIB World Building Congress in Finland, the largest global construction research event of the year with 625 papers. Underpinning research [G1] won the UALL award for 2018 (see section 4 and 5.1).

G1.CADRE (Collaborative Action towards Disaster Resilience Education), European Commission Lifelong Learning Programme Multi-lateral projects, €569,000.

G2.ASCENT (Advancing Skill Creation to ENhance Transformation), European Commission, Erasmus+ Call: Capacity Building in the Field of Higher Education EAC/A04/2014, €983,000.

3. References to the research

Publications [3.1] and [3.4] are high quality, reputable journals in the field of disaster risk and have a double-blind peer review policy. Publications [3.2], [3.3] and [3.6] were published in the proceedings of international conferences in construction and/or disaster risk, and had a double-blind peer review process conducted by international scientific committees. Publication [3.5] is a major dissemination report of the CADRE project, approved by the funding agency. It had an appointed Editorial Board responsible for the output's quality.

3.1 Malalgoda, C., Amaratunga, D. and Haigh, R. (2016) Overcoming challenges faced by local governments in creating a resilient built environment in cities. *Disaster Prevention and Management*, 25 (5). pp. 628-648. <http://dx.doi.org/10.1108/DPM-11-2015-0260>

3.2 Malalgoda, C., Amaratunga, D., Keraminiyage, K. and Haigh, R. (2016) [Knowledge Gaps in the Construction Industry to Increase Societal Resilience: A Local and National Government Perspective](#). In: Proceedings of the CIB World Building Congress 2016. Tampere, Finland,

pp. 543-556. ISBN 978-952-15-3745-5. This paper received the Best Paper Award at the CIB World Building Congress, Tampere, Finland, in June 2016.

- 3.3 Amaratunga, D. Haigh, R., Malalgoda, C. and Keraminiyage, K. (2016) [Knowledge gaps in the construction industry to increase societal resilience to disasters](#). In: Proceedings of the 6th International Conference on Building Resilience. Massey University / The University of Auckland, Auckland, New Zealand, pp. 1089-1099. ISBN 978-0-473-37268-2.
- 3.4 Amaratunga, D., Malalgoda, C. & Keraminiyage, K. (2018) "Contextualising mainstreaming of disaster resilience concepts in the construction process", International Journal of Disaster Resilience in the Built Environment, Vol. 9 Issue: 4/5, pp.348-367, <https://doi.org/10.1108/IJDRBE-10-2017-0057>
- 3.5 Amaratunga, D., Haigh, R., Malalgoda, C. and Keraminiyage, K. (2017) [Mainstreaming disaster resilience in the construction process: Professional education for a resilient built environment. Project Report](#). A report of the CADRE project.
- 3.6 Dias, N., Amaratunga, D., Haigh, R., Malalgoda, C., & Nissanka, S. (2020). Integration of the Concept of Disaster Resilience for Sustainable Construction—An Analysis on the Competency Requirements of the Built Environment Professionals. In R. Dissanayake, P. Mendis, K. Weerasekera, S. De Silva, & S. Fernando (Eds.), ICSECM 2019. https://doi.org/10.1007/978-981-15-7222-7_37 [can be supplied on request]

4. Details of the impact

The research and resultant impact of G1 (Amaratunga, Haigh and Malagoda) won the UK Universities Association for Lifelong Learning (UALL) International Award for 2018 [5.1], the best project to demonstrate an innovative partnership that created change in an international context.

4.1 Policy and practice of international agencies have been influenced by the research

Knowledge gaps and competencies [3.3, 3.4] and policy recommendations to mainstream disaster resilience into the construction process [3.5, 3.6] have been used as guidance and are cited in UN publications that target local government leaders. These are linked to UNDRR's global Making Cities Resilient campaign (MCR) that began in 2010, including 'Ten Essentials' for MCR and has engaged formally with over 4,360 cities worldwide. UNDRR are the UN focal point for DRR and were a research partner on G1. Amaratunga and Haigh were founding members of the MCR campaign steering committee and the only two formally appointed UK Advocates [5.2].

Jerry Velasquez, Head of Advocacy and Outreach, UN Office for Disaster Risk Reduction (UNISDR) [5.3] confirmed that: *"We recognise the need to engage all stakeholders in implementing the Sendai Framework and to better address the construction sector in our advocacy work and guidance. The knowledge gaps and recommendations to mainstream disaster resilience into the construction process have been vital in updating our Ten Essentials, supporting tools and guidance for cities. It has ensured that these UN led efforts address the vital role of the construction sector. The 'Handbook for Local Government Leaders' was used by over 4,000 cities that are part of the Campaign"*.

The research is embedded (page numbers are listed in section 5 below [5.2]) across sections of 2017 How to Make Cities More Resilient: A Handbook for Local Government Leaders [5.2], a UN Handbook that targets national policy makers and local government leaders around the world, supporting public policy and decision making to reduce disaster risk. It sets out practical guidance for putting the 'Ten Essentials for MCR' into action, and is published by UNDRR. Direct inputs were included in the sections on engaging stakeholders, using risk assessments to devise risk action plans, establishing action plans including indicators, different strategies for local governments to finance risk reduction, monitoring and follow up, as well as two case studies. The guidance points to the role of the construction sector in supporting resilience building efforts.

The knowledge gaps [3.3, 3.4] and policy recommendations [3.5, 3.6] were used to inform updates to seven of ten essentials [5.2, 5.3] so that they better reflect the contributions and requirements from the construction industry, including: organise for disaster resilience; identify, understand & use current and future risk scenarios; strengthen financial capacity for resilience; strengthen institutional capacity for resilience; increase infrastructure resilience; ensure preparedness and effective disaster response; and, expedite recovery and build back better.

Review research conducted by UNDRR in 2018 indicates that cities that have joined the campaign have made greater progress in reducing disaster risk than cities that have not gone through a similar process of disaster risk awareness [5.4].

4.2 Influenced disaster risk reduction policies and practices, and changed legislation at the city level

The direct influence on local policies and practices through the UN Handbook described in 4.1 is illustrated by M S Naleem, representing the Eravur Urban Council in Sri Lanka [5.5]: *“The Handbook for Local Government has provided us with practical guidance so that we can better assess risks, implement improved action plans for construction projects in Sri Lankan cities, and establish mechanisms for on-going monitoring”*. He went on to add, *“The knowledge gaps and policy recommendations for local government have helped us to better integrate DRR within our urban development planning processes in a participatory manner. This has included updating our processes for land zoning and making our planning and design processes more risk aware”*. The supporting letter confirms: *“The case studies on construction processes and development from other cities have also helped us to strengthen institutional capacity for resilience at the local level. It has guided our efforts in applying the Ten Essentials to our city”*.

The challenges identified [3.1] and knowledge gaps that emerged [3.4] have resulted in changes to a by-law in Sri Lanka, facilitated by Amaratunga and Haigh’s close engagement with the FSLGA, who were a partner on G1 and G2. This included sensitisation of the research findings with eighteen Sri Lankan Ministers, Chief Secretaries, Commissioners of Local Government, City Mayors and the Director and Additional Secretary from the Ministry of Local Government.

Hemanthi Goonesekera, Chief Executive Officer of the FSLGA, confirmed that [5.6]: *“The [CADRE] results have led to us updating the national and local frameworks of laws, regulations and public policies that guide the public and private sectors in addressing disaster risk in publicly owned, managed or regulated services and infrastructures. The outcomes of these discussions led to us revisiting the way building regulations are enforced and in identifying what training and support is given to local officials regarding disaster risk and resilience building”*. She stated that, *“The influence of their CADRE work is reflected in the development and introduction of a specific by-law on integrating disaster management in local government authorities”*.

4.3 Impacts on professional services including the environment (green objectives)

The knowledge gaps were used as the basis for updating two of the Green Building Council of Sri Lanka’s (GBCSL) sustainability rating systems so that construction projects address disaster risk as part of wider green development objectives. This included changes to nine of the criteria for the GREENSL® Rating System for Built Environment in Sri Lanka and nine of the criteria for the GREENSL® Rating System for Green and Smart Cities.

Ranjith Dissanayake, Chairman of the GBCSL, confirmed that [5.7]: *“These changes have been formally embedded within GREENSL® Rating System Version 2.0. Sixty-one buildings in Sri Lanka have been rated using the system”*. He also confirmed that the updated GREENSL® Rating System for Green and Smart Cities, *“is now being used across cities in Sri Lanka”*. These systems are used in Sri Lanka by cities, private & government clients, and the construction industry to promote and measure compliance with goals on sustainability.

4.4 Informed policy debates and policymakers make use of research-based critical evidence synthesis in developing policy on disaster risk reduction

The policy recommendations [3.5, 3.6] have informed the Colombo Declaration [5.8], which promotes the application of science, technology, and research in Sri Lanka for enhanced multi-hazard early warning and DRR, and supports implementation of the SFDRR. The Declaration, made in December 2020, is a commitment from various Sri Lankan government ministries and technical agencies, together with other national and international key stakeholders. Clause 12 of the seventeen commitments embedded within the declaration is concerning the promotion of evidence-based, climate-smart, risk-sensitive public and private investments, including the development and retrofitting of disaster resilient buildings and infrastructure.

Ranjith Senaratne, Chairman of the National Science Foundation, confirmed that [5.8]: *“The research evidence from the University of Huddersfield on the need for changes to close the policy-science gap, and for a multi stakeholder and multi-hazard approach to the development of risk sensitive buildings and infrastructure, were used as central tenets of the Colombo Declaration”.*

4.5 Influenced professional bodies and training, and increased understanding and awareness/attitudes of disaster risk reduction among construction industry professionals

At a global level, the research has resulted in an increased understanding and awareness / attitudes of DRR among accredited professionals in the construction sector through the RICS, with the research findings [3.5] presented in the Nov/Dec 2017 RICS Building Control journal cover story [5.9], the journal of the Building Control Professional Group at RICS with over 2.8 million page views per month. RICS has a global membership of 134,400 (2018).

The research knowledge gaps have also informed the introduction of a module on DRR in the built environment, offered as part of the GBCSL’s Associate Professional Training Course for more than 1000 green associate professionals and around 100 green accredited professionals in Sri Lanka [5.7], who are now working in the Sri Lankan construction industry.

Mr Wijesooriya, Managing Director of Lego International, illustrated the impact of these changes on the training of their staff [5.10]: *“As a leading contractor in Sri Lanka, several of our construction professionals, including architects, construction managers, quantity surveyors and engineers, have benefited from the Associate Professional Training Course. This training helps ensure our staff maintain the highest professional and ethical standards, including a responsibility to consider disaster risk in our construction practices”.*

5. Sources to corroborate the impact

- 5.1. [UALL website](#) corroborating International Award win in March 2018 for G1 as an innovative partnership that created change in an international context.
- 5.2. [How to Make Cities More Resilient, A Handbook For Local Government Leaders](#) by UNISDR for corroborating Amaratunga as a partner in the handbook development and specific inputs (pages 4, 19, 20, 34, 52, 74, 84, 86, 88, 94, 96, 99), and UK Advocate Certificates corroborating our formal involvement in UN global MCR campaign.
- 5.3. Supporting statement by Head of Advocacy and Outreach, UNISDR describing specific contributions of our research to the handbook (5.2) and MCR campaign ten essentials.
- 5.4. [Making Cities Resilient Report 2019](#) which cites 3.1 and [Report on the Making Cities Resilient \(MCR\) Campaign: Comparing MCR and non-MCR cities](#) which cites 3.1 and 3.5, both published by UNDRR and evidence the improved performance of campaign cities in addressing disaster resilience when compared to non-campaign cities.
- 5.5. Supporting statement by Chairman, Eravur Urban Council, Sri Lanka, corroborating the influence of our work on city level disaster risk reduction policies and practices.
- 5.6. Supporting statement by Chief Executive, FLSGA, corroborating the influence of our research on the development and introduction of a specific by-law on integrating disaster management in local government authorities in Sri Lanka.
- 5.7. Supporting statement by Chairman, GBCSL describing the influence of research on GREENSL® Rating System for Built Environment in Sri Lanka and GREENSL® Rating System for Green and Smart Cities criteria, and Associate Professional Training Course.
- 5.8. [Colombo Declaration of Multi-Hazard Early Warning and Disaster Risk Reduction 2020](#) by Disaster Management Center of Sri Lanka, and supporting letter by NSF Chairman describing the impact of our work on Clause 12 of this declaration on DRR policy.
- 5.9. [RICS Building Control journal cover story](#) on *Risk and resilience* by Amaratunga that is based on G1/3.5. Journal has over 266,000 unique users and 2.8m page views per month.
- 5.10. Supporting statement by Managing Director of Lego International, confirming the impact of our research on the professional training of staff through GBCSL.