



International Research Symposium on
**Climate Change Adaptation in the
Coastal Built Environment**

19th and 20th June 2023

BOOK OF ABSTRACTS

Organised by



IHcantabria
INSTITUTO DE HIDRÁULICA AMBIENTAL
UNIVERSIDAD DE CANTABRIA

University of
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**L-Università
ta' Malta**



Edited by

Maria Merino Gonzalez-Pardo
Shavindree Nissanka

Ignacio Aguirre Ayerbe
Chamindi Malatgoda

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Chamindi Malalgoda

June 2023

Maria Merino Gonzalez-Pardo, Ignacio Aguirre Ayerbe, Shavindree Nissanka & Chamindi Malalgoda (*edited by*)

International Research Symposium on Climate Change Adaptation in the Coastal Built Environment

19th-20th June 2023

IHCantabria. Universidad De Cantabria. Santander, Spain

BOOK OF ABSTRACTS

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Preface

Climate change has many consequences on natural and human systems, including, among others, sea level rise, flooding, erosion, intense droughts, water shortages, severe fires, melting of the poles, more intense and frequent storms and declining biodiversity. Coastal areas are not exempt from these climate change related impacts, probably the most pressing being those related to sea level rise, flooding and erosion. In the specific context of the coastal built environment, these impacts may become a direct threat to its human, physical, economic, social, environmental and governance components. Considering the increasing impacts of climate change on the coastal built environment, adaptation strategies need to be developed in addition to the current mitigation efforts to reduce greenhouse gas emissions.

Coastal zones are very complex, both from the point of view of natural and human systems and the interaction between them. This, together with the uncertainties associated with climate change-related studies, makes the planning and implementation of climate change adaptation strategies a major challenge for managers, administrations and professionals.

This book brings together the abstracts presented, and details of side events and activities, at the International Symposium on Climate Change Adaptation in the Coastal Built Environment, held from 19th – 20th June 2023. It includes over 40 abstracts by scholars, scientists and practitioners from around the world. Selected scientific papers will be considered for publication in the Book Volume "Climate Change Adaptation in the Built Environment" with Springer Nature.

The symposium is organised by the Environmental Hydraulics Institute of the University of Cantabria (IHCantabria), Spain; the Global Disaster Resilience Centre, University of Huddersfield, UK; Lund University, Sweden; University of Malta, Malta; University of Moratuwa and University of Colombo, Sri Lanka. The Symposium is organised in association with: Built Environment leArning for Climate adaptatiON (BEACON), an EU Erasmus+ funded project.

This high-level international symposium is intended to encourage a debate and discussion on how a holistic approach to the built environment in coastal areas can help address some of the challenges and provide effective support for climate change adaptation. It will promote sharing knowledge among the research community and practitioners in the field and encourage multidisciplinary and multi-sectoral interaction. The symposium is organised by the project consortium of BEACON, a European Commission funded project.

Alongside the many excellent scientific, policy and practice orientated abstracts, the symposium organisers are delighted to welcome two keynote lectures and a panel discussion on the Spanish challenges for climate change adaptation, by leading academics, professionals and government officers.

We very much hope you enjoy the conference.

Conference chairs:

Maria Merino Gonzalez-Pardo and Ignacio Aguirre Ayerbe

IHCantabria, Universidad de Cantabria, Spain

About the Editors

Maria Merino Gonzalez-Pardo



Maria Merino Gonzalez-Pardo Researcher and senior consultant at the Coastal Management and Engineering Reserach Group - IHCantabria, Spain. In her career spanning 15 years so far, he has worked in the management and implementation of projects supported by international development organisations including: the Inter-American Development Bank, World Bank, UNDP, as well as initiatives supported by the European Union. Her primary areas of professional expertise and research work are: Integrated Coastal Zone Management, disaster risk and vulnerability reduction, climate change impact and adaptation in coastal areas, environmental and coastal planning and capacity development.

Previously, she worked inthe field of environmental management, environmental impact assessment and land use planning. She has undertaken consultancy and research work in: Barbados, Colombia, Cyprus, Dominican Republic, Egypt, El Salvador, Germany, Indonesia, Ireland, Ivory Coast, Jamaica, Malta, Myanmar, Oman, Peru, Spain, Saudi Arabia, Sri Lanka, The Bahamas, The Maldives, The Philippines and Qatar.

In terms of publications, she is co-author of publications in the field of coastal management, Maritime Spatial Planning, tsunami risk reduction, multi-hazard early warning systems and climate change adaptation in the built environment.

Ignacio Aguirre Ayerbe



Ignacio Aguirre Ayerbe is a researcher and senior consultant at the Coastal Management and Engineering Research Group - IHCantabria, Spain. In his nearly 15 years of career so far at IHCantabria, he has worked with several institutions and governments in multiple projects related to Disaster Risk Management and Planning, Vulnerability and Adaptation to Climate Change, Integrated Coastal Zone Management and Coastal Planning, including activities related to participatory processes, capacity building, communication, and dissemination. He is particularly interested in integrating scientific and technical advances into local management, strategies and plans for disaster risk management and coastal management, integrating in all processes the knowledge, skills, and particularities of populations and livelihoods at the community level. He has carried out this consultancy and research work in several countries, such as Antigua & Barbuda, Bahamas, Barbados, Belize, Cyprus, Dominican Republic, Jamaica, Saint Vincent & the Grenadines, Trinidad & Tobago, El Salvador, Indonesia, Maldives, Myanmar, Oman, Paraguay, Peru, Qatar, Sri-Lanka, The Philippines, Tunisia, Spain, European Union (EU) and United Kingdom.

His work, research and consultancy activities also include several conference proceedings and publications in scientific journals and he usually collaborates with several international institutions related to risk management, being co-chair of the IOC UNESCO Task Team on Tsunami Ready and member of the Steering Committee of the Intergovernmental Coordination Group of the NEAMTWS region (ICG/NEAMTWS), collaborates with the United Nations Office for Disaster Risk Management (UNDRR), the Disaster Risk Management Centre of the European Commission (DRMCC), and is member of some relevant associations in the field, such as the Global Tsunami Modelling Network.

Shavindree Nissanka



Shavindree Nissanka, is a doctoral researcher and a full time research assistant affiliated to the Global Disaster Resilience Centre (GDRC), University of Huddersfield UK. She has completed her Bachelor of Science in Quantity Surveying. She is also qualified in both Management accountancy and financial accountancy. She is an Associate Member of the Chartered Institute of Management Accountants (ACMA, CGMA) and member of the Association of Chartered Certified Accountants (ACCA) UK. After serving Sri Lanka as a quantity surveyor, construction manager, corporate finance executive as well as a part time lecturer in Quantity Surveying for several years she received a full funded doctoral scholarship at the Global Disaster Resilience Centre, University of Huddersfield, UK. She is currently reading for her PhD on the use of Financial Incentives for promoting a Disaster Resilient Housing. As a full time, researcher at GDRC she currently works for the BEACON (Built Environment Learning for Climate Adaptation). She has also contributed to other research initiatives led by GDRC in the fields of built environment learning for climate adaptation and disaster resilience in smart cities and infrastructure resilience. Few of those initiatives are developing disaster resilient building codes for Sri Lanka, Development of the Standard Operating Procedures for the Tsunami Early warning system in Sri Lanka, developing a guide for built environment professionals done by GDRC and Royal Institute of Chartered Surveyors (RICS). She has presented her work in many international conferences and also has published in the research arenas of Disaster Resilient Properties: Built Environment Discourse, disaster Resilient Building Codes in Sri Lanka, Employment challenges in mega construction projects in Sri Lanka and Integration of the Concept of Disaster Resilience for Sustainable Construction. More details can be found at <https://pure.hud.ac.uk/en/persons/shavindree-nissanka>

Chamindi Malalgoda



Dr Chamindi Malalgoda is a senior lecturer and the quantity surveying course leader at the Department of Design and Built Environment, University of Huddersfield, UK. She is also a member of the University's Global Disaster Resilience Centre (GDRC). Chamindi completed her PhD in 2014 on the theme of empowering local governments to make cities resilient to disasters and is currently managing several European-funded research projects related to disaster resilience and management. She has co-led and successfully delivered research grants funded by the Erasmus+ programme under Strategic Partnerships and International Credit Mobility, including REGARD (Rebuilding after displacement) project completed in March 2022. She has contributed to over 40 publications, which include refereed journals, conference papers and various high-impact reports. She is also a reviewer of several international journals in the fields of disaster resilience, construction and property management and recently guest edited a special issue on "Rebuilding communities following disasters and conflict-induced mass displacements" in the Sustainability journal and co-edited a Springer book volume on "Rebuilding Communities after Displacement". More details can be found at: <https://pure.hud.ac.uk/en/persons/chamindi-malalgoda>

About the Symposium

Climate change is one of the greatest threats facing humanity and it is affecting every country on every continent. The impact of climate change is particularly pertinent to the built environment in coastal regions given the socioeconomic importance of this area and the expected impacts related to rising sea levels, increase frequency of extreme events and changes in coastal dynamics, in addition to changes in temperature or precipitation. It is important to better understand the impacts of climate change and the existing capacities to develop tangible climate adaptation measures for the built environment in coastal regions.

In addressing this adaptation challenge, we must change how we approach urban planning and design, construct and retrofit the built environment. Climate change adaptation in the coastal built environment goes beyond addressing physical and environmental needs. It must also address socio-cultural, institutional, human capital, and economic perspectives to promote efficient climate change adaptation measures.

This high-level, international symposium will encourage debate and discussion on how a holistic approach to climate change adaptation in the built environment can help address some challenges and provide effective policies and methods for climate change adaptation in the coastal built environment. It will promote knowledge-sharing among the research community and practitioners in the field and encourage multidisciplinary and multi-sectoral interaction. The symposium is organised by the project consortium of BEACON, an ERASMUS + project, co-funded by the European Commission.

This symposium brings together the leading scientists around the world and experts, practitioners and academics in the field of displacement to share their knowledge and experience. This event also provides an opportunity to showcase and explore innovative research, policy and practice in an area that is gaining importance due to the adverse impact of climate change.

Symposium Themes:

- The governance framework for Climate Change Adaptation in the built environment.
- Climate Change Adaptation in the built environment and land use planning
- Communicating Climate Change Adaptation
- Climate change education

BEACON International Symposium Committee

June 2023

Acknowledgements

As the conference chairs of the International Symposium on Climate Change Adaptation in the Coastal Built Environment, we are delighted to have the opportunity to hold this Symposium.

The Conference organising committee, including the Steering Committee members of the BEACON project, met regularly and all involvements have provided a willing source of on-going support and guidance that is very much appreciated. Our thanks also go to the International Scientific Committee members who made extensive efforts in reviewing abstracts to tight time scales in ensuring the high quality of the symposium.

The symposium was organised as part of BEACON (Built Environment leArning for Climate adaptatiON) project on “climate change adaptation in the built environment in coastal zones”. BEACON is a European Commission funded Erasmus+ 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. We also thank the University of Cantabria for the additional financial support provided, and the University of Huddersfield for the coordination of the BEACON project.

We thank the keynote speakers and panellists for their willingness to stimulate invaluable discussions and debate around the climate change impacts in coastal areas from different perspectives. We also thank the session chairs for agreeing to ensure the symposium is as challenging, exciting and rewarding as possible.

We have received exceptional help and support from a number of people, organisations and bodies in the work for this symposium. We would especially like to acknowledge the board of directors and the administration and communication teams at IHCantabria for being the focal point in the technical aspects of the symposium, with a special mention to Dr Raúl Medina, General Director, who always supports our initiatives. We also thank our colleagues from the Coastal Management and Engineering, and the Climate Risks, Adaptation and Resilience Research Groups at IHCantabria, who worked very hard to make this symposium a success and for being there whenever we needed help. We want to thank Laura Pérez for her unconditional efforts towards the symposium and for coordinating all the activities.

Shavindree Nissanka also deserves a special mention for supporting the elaboration of this Book of Abstracts. Finally, we would like to thank all the participants for their active participation at the symposium and for their positive commitments towards the BEACON project activities. Most of all, we want to thank the presenters for their willingness to stimulate invaluable discussions and debate around the symposium theme.

Conference chairs:

Maria Merino Gonzalez-Pardo and Ignacio Aguirre Ayerbe

IHCantabria, Universidad de Cantabria, Spain

Conference Organisation

Organised by

IHCantabria - Universidad de Cantabria

Spain

Global Disaster Resilience Centre

University of Huddersfield, UK

Lund University

Sweden

University of Malta

Malta

University of Colombo

Sri Lanka

University of Moratuwa

Sri Lanka

In association with

Built Environment Learning for Climate Adaptation (Beacon), a collaborative research project co-funded by EU Erasmus+ programme.

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IHCantabria, Universidad de Cantabria, Spain

Conference Partners



IHCantabria – Universidad de Cantabria, Spain

The University of Cantabria (UC) is a Spanish university with around 1,600 researchers and 13,200 students (from which 740 are PhDs), 4 associated research centres (two of which are joint initiatives with the Spanish Research Council, CISC, and 160 R+D groups from 32 departments). UC is one of 9 Spanish universities selected in the “Campus of International Excellence” Programme, promoted in 2009 by the Spanish Government in the first call.

The Environmental Hydraulics Institute “IHCantabria” is a joint research centre that carries out research, knowledge transfer and training of specialists in the fields of fresh and saltwater. It was founded in 2007 integrating two university research groups with over twenty years of expertise in the fields of hydrodynamics; sediment transport; coastal evolution; coastal structures; coastal/ports/river engineering; estuarine dynamics; transport processes; marine and river environmental sciences; water quality; natural and anthropogenic coastal risks; numerical and physical modelling of water-related processes and integrated coastal and river basin management. The UC-IHC is fully involved with R&D Spanish or international programmes, independently or jointly with universities, institutes, or companies worldwide. The UC-IHC has been involved in EU FP5 programs, FP6, EU FP7, H2020 (TELWIND, UPWAVE, MARIBE, ERANET4CS, HYDRALAB+), ERASMUS+ (TROYO, CABARET); ERANET (SEAPORTS, CAPTOW) and COST actions (EMBOS, PESFOR-W, OCEANGOV). Since 2003, the UC-IHC has provided scientific and technical assistance to the Environment Dept of the Regional Government regarding different tasks for the development of the Water District Plans including: hydrology modelling, risk assessment (flooding, water quality). It also participated at the intercalibration exercise of biological elements for the harmonization of the ecological status assessments carried out along Europe and coordinated by JRC, leading the vegetation NEA GIG. At the National level, UC-IHC supports the Spanish Ministry of Environment for the development of the National Report on Integrated Coastal Zone Management required by the 2002/413 ICZM Recommendation. UC-IHC has also prepared a catalogue of measures for management plans of flooding risks on the Spanish coast. The UC-IHC also takes an active part of the Intergovernmental Oceanographic Commission (IOC) – UNESCO, as co-chairman in WG1 in the ICG/NEAMTWS. Researchers of UC-IHC have been also actively involved in different master and PhD programs (200 Masters’ Thesis and 61 PhD), within the discipline of the Environmental Hydraulics and the Hydrobiology, which were awarded the highest rank given by the Spanish Ministry of Education. Currently, two master programs (Harbour and Coastal Engineering / Integrated Management of Water Systems) and one PhD program (Coastal Engineering, Hydrobiology and Environmental Management of Aquatic systems) constitute good examples of transdisciplinary and innovative High Education approaches, focused on a continuous learning update of practical skills and competences for students and professionals.



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

A global leader in 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?

The Global Disaster Resilience Centre (GDRC), based at the School of Applied Sciences, University of Huddersfield, UK, are working with stakeholders at the global, national and local level to make this happen. This work includes the support of stakeholders towards achieving the outcome and goal of The Sendai Framework for Disaster Risk Reduction 2015-2030, and its integration with The Paris Agreement of the United Nations Framework Convention on Climate Change, and the 2030 Agenda for Sustainable Development.

Our work recognises that with growing population and more extensive and interconnected built environments, the world's exposure to hazards is increasing. It is urgent and critical to anticipate, plan for and reduce disaster risk in order to more effectively protect people, communities and countries. When disaster does strike, communities may need to be rebuilt physically, economically and socially.

At the Global Disaster Resilience Centre, 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.

In order to achieve our aims, our objectives are to:

- Carry out internationally outstanding, original, significant, rigorous, innovative and potentially agenda setting research
- Secure significant, high profile and prestigious grants
- Produce quality publications that target a range of stakeholders
- Influence decisions within political, economic, and social systems and institutions
- Inform professional practice, raise awareness and develop skills to tackle disasters
- Establish mechanisms for the transference of knowledge to the market, government and professionals
- Attract high calibre students to conduct world class research in key emerging areas

Our work:

- Tackles disaster risk factors and scenarios, including emerging disaster risks
- Addresses regional, national and local application
- Supports action by local communities and authorities
- Supports the interface between policy and science for decision-making

The Centre's expertise includes (but is not limited to):

- Physical, social and economic resilience
- Disaster resilient cities
- Disaster resilient infrastructure
- Urban development and disaster risk
- Reconstruction and sustainable development
- Empowerment of women and vulnerable groups
- Multi-hazard early warning
- Displacement
- Business continuity management
- Investment for disaster risk reduction
- Integrating risk reduction and climate change adaptation
- Disaster risk governance
- Conflict sensitive reconstruction
- Climate change Adaptation
- poverty alleviation and international development
- Risk communication

GDRC Key facts

- Winner of the 2019 Prestigious Newton Prize recognises the best research and innovation projects which create an impact socially and economically
- Managed over 20 research grants worth £15m since 2014
- Collaborate with higher education, government, private sector and non-government partners in Europe, Asia, Australia/Oceania, Africa, North America and South America
- Founding Steering Committee Members and UK Advocates of the UN Making Cities Resilient campaign
- Member of the UNDRR, European Science and Technology Advisory Group (E-STAG)
- Founders of the International Conference on Building Resilience Series
- Editors of International Journal of Disaster Resilience in the Built Environment, published by Emerald, indexed and abstracted in SCOPUS
- Expert members - IOC UNESCO ICG/IOTWMS ICG/IOTWMS WG-1 on Tsunami Risk, Community Awareness & Preparedness, and inter-sessional Task Team on “Tsunami Preparedness for a Near-Field Tsunami Hazard
- Winner of the International Research Project Award for the Collaborative Action towards Disaster Resilience Education Project in 2017
- Invited member of the UNDRR GRAF (Global Risk Assessment Framework Working Group on Risk Communication
- A member of the UNDRR Expert Review Group (ERG) for the Development of a new Global Disaster Risk Reduction Research Agenda towards 2030 and beyond
- Steering Committee Member of the UK’s Frontiers Programme, which is the joint programme of the UK four national Academies: The Royal Academy of Engineering, the Academy of Medical Sciences, the British Academy, and the Royal Society

Professor Dilanthi Amaratunga and Professor Richard Haigh, together with their team, have actively contributed towards establishing better informed and more socially inclusive public policymaking and implementation towards the development of a disaster resilient built environment.

For more information about our research, teaching and advocacy, please contact Professor Dilanthi Amaratunga and Professor Richard Haigh, Global Disaster Resilience Centre, University of Huddersfield, Queensgate, Huddersfield, HD1 3DH, United Kingdom.

For more information about the research centre:

<https://research.hud.ac.uk/institutes-centres/gdrc/>

GDRC Annual report 20200:

<http://gdrc.buildresilience.org/gdrc-report-2022/>



University of Malta, Malta

University of Malta (UM) is the sole public and highest teaching institution in Malta and its structures are in line with the Bologna Process and the European Higher Education area. UM has a 400-year history and there are over 11,000 students including 1000 foreign/exchange students from nearly 92 different countries, following full-time or part-time degree and diploma courses, with 3,500 students graduating each year. UM is comprised of 14 Faculties and several interdisciplinary Institutes and Centres. Besides the main campus, situated at Msida, there are three other campuses: Valletta, Marsaxlokk, Gozo. The University has been involved as coordinator and partner in numerous EU-funded projects under various Programmes including FP5/6/7, Horizon 2020, Lifelong Learning Programme, Culture 2000, Tempus, Erasmus+, INTERREG EU-MED-ITALIA MALTA-ENPI CBC MED and various other international and national programmes and initiatives. The University is also represented in a number of European and international University networks and groups. Furthermore, UM team will be supported by the following departments: (i) Research Support Services Directorate; (ii) Project Support Office; (iii) Knowledge Transfer Office; (iv) Communication office; (v) Centre for Entrepreneurship and Business Incubation; (vi) Legal office; and (vii) IT services. The University of Malta participation will be primarily from the Department of Construction and Property Management, Materials Engineering and Structural Vulnerability group active in Eco Materials and waste recycling, cement & concrete research and durability performance, Life Cycle Analysis and Sustainable Construction and Structural Vulnerability and Resilience. In addition, the Research Group collaborates with other departments in Sensor systems for structural health monitoring of structures and durability monitoring. The participants bring expertise in various technical aspects of the project including Eco materials, Cement Bound materials and durability performance, transport properties and degradation mechanisms and also sensor systems and technology. The participants have carried out local and internationally funded research projects including collaborative projects. The research group consists of a multi-disciplinary collaborative team with Prof. Ruben Paul Borg as lead academic for Materials and Vulnerability, with other academics including Prof. Edward Gatt (Sensor network systems), Dr. Glorianne Borg Axisa (Education and Geography); Prof. J. Buhagiar (Bio-Sustainable Materials); 2 PhD students (Materials and sensor network systems); Various Masters students; 2 (Paid) Research Officers; Laboratory staff and other support staff.



LUND
UNIVERSITY

Division of Risk Management and Societal Safety, Lund University, Sweden

Research, education and serving local, national and international communities in all hazards - all society risk management and risk reduction

Founded in 1666, and today with 40,000 students and 8,160 staff, Lund University (LU) is ranked among the world's top 100 universities in the world. The University offers one of the broadest ranges of programmes and courses in Scandinavia, based on cross-disciplinary and cutting-edge research.

The Division of Risk Management and Societal Safety is a leading centre in research and education on how people, organisations and society prepare for, deal with and recover from events that might threaten something of value.

We study how events themselves are managed (during an emergency/crisis) and how risk is managed (before the events). Even though the contexts in which the research is conducted are diverse, and the problems studied might vary considerably, a key aspect that characterise them all is the presence, and importance, of uncertainty. Uncertainty, in the present context, stems from the fact that we cannot fully know what will happen in the future. However, a key assumption in risk management is that our actions today may influence future outcomes in a positive way. Thus, despite considerable uncertainty we may do actions today that result in a better outcome tomorrow. Our work takes place across disciplines where crises are not confined or isolated to one domain or realm – from natural hazards affecting infrastructure and people, to climate change impact transforming how societies arrange and manage themselves, and to population movement and displacement resulting from disasters or conflict.

International co-operation with other universities and organisations is central to the work at the Division. Our partnerships range from Scandinavian and worldwide universities, to advising Swedish government agencies, and all the way to the UN system, the Red Cross movement and several donor agencies. The Division of Risk Management and Societal Safety plays an important role in several educational programmes at Lund University, as well as commissioned education for continuing professional development.

Professor Mo Hamza, together with his team, has engaged and, continues to, work with and advise organisations such as: The World Bank, Asia Development Bank, UNDP, UNISDR, DfID, IFRC, Sida, ActionAid, Swedish Red Cross, The Raoul Wallenberg Institute for Human Rights, and the Swedish Civil Contingencies Agency (MSB) on projects and assignments focusing on disaster risk and vulnerability reduction, post-disaster recovery, climate change impact and adaptation in fragile and failed states, environmental displacement and capacity development.

For more information about our research, teaching and advocacy, please contact Professor Mo Hamza, Division of Risk Management and Societal Safety, Department of Building and Environmental Technology, Faculty of Engineering, Lund University, P.O. Box 118, 221 00 Lund, Sweden.

For more information about the Division: <https://www.risk.lth.se/>



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

Founded in 1921, University of Colombo is the oldest university in Sri Lanka, consisting of 9 faculties, 59 academic departments, a campus, a school, 7 institutes and over 20 centres and units. This renowned university provides unmatched knowledge, skills, and timely research exposure to its student population of more than 11,000 in number. The university also has a well-recognized team of academic experts with national and international experience and exposure in their respective fields. The university has a strong commitment towards research and academics in various disciplines engage in high quality research of local and international relevance.

The Faculty of Arts is the largest faculty in the university in terms of student enrolment. Its vision is to be a Centre of excellence in creative thinking, teaching, research and community outreach in the South Asian region while its mission is to promote collective scholarship, critical inquiry, competencies and skills in the social sciences and humanities, keeping in line with the highest academic and ethical standards of teaching, research, training and evaluation. The faculty has 11 academic departments and several teaching units which offer courses in the field of Social Sciences and Humanities. Apart from undergraduate BA courses, several departments offer courses for diplomas, masters and Ph.D. degrees.

The Social Policy Analysis and Research Centre (SPARC) is a research Centre of the Faculty of Arts, University of Colombo. It is a pioneering force in multi-disciplinary research. Professor Nishara Fernando is the director of the Centre. The establishment of SPARC is the culmination of a process set in motion at the university several years ago with the launch of the Improving Capacities for Poverty and Social Policy Research (IMCAP) in the late 2000s. IMCAP was a staff and student development programme which was implemented to strengthen the skills of younger academics from different social science backgrounds on poverty and social policy analysis and research.

The Centre conducts its research in diverse fields including disaster management, disaster resilience, built environment, climate change, disaster relocation, development induced relocation, vulnerable groups in post war situations, impact assessments, vulnerability assessments, youth studies, violence against children and women, and cyber violence. These focal areas are reviewed from time to time, keeping with new experiences gained within the university and emerging critical issues that require expert attention.

For more information about SPARC visit: <https://sparc.cmb.ac.lk/>



Department of Civil Engineering, University of Moratuwa, Sri Lanka

University of Moratuwa (UoM), Sri Lanka operates under the general direction of the University Grants Commission. University of Moratuwa, consists of five faculties namely, Architecture, Business, Engineering, Graduate Studies and Information Technology with twenty two (22) academic departments offering twelve (12) Bachelor's degree programs to students selected by the University Grants Commission (UGC) and fifty-six (56) postgraduate programs together with MSc, MPhil & PhD research-based postgraduate degrees. The university has an undergraduate student population of 9916, and 1050 NDT diploma students of the Institute of Technology of University of Moratuwa (ITUM). University of Moratuwa has a highly qualified academic staff of 423 with an administrative staff of 31. It must be highlighted that the University has been increasing the annual intake of students over 75% overall and 200% in the IT Faculty during the last ten years to meet the increasing demand for our degree programs and thereby catering the human resource development of our nation. UoM, as an internationally positioned Sri Lankan University, aims to provide transformative education in technological and related disciplines, carrying out nationally relevant and high-impact research to expand the boundaries of knowledge and to enhance the national technological capabilities, provide expert services to the State, Industry and the Society, and contribute to sustainable, scientific, technological, social and economic development of Sri Lanka. UoM is a centre for excellence in research and development in innovation and technology, with each Faculty in the university having its own research unit. There are many research and development work being done in the university with industry collaboration, research labs have been established to promote University Industry Partnerships (UIPs). One such outcome is Disaster and Emergency Warning Network (DEWN), only mobile app in Sri Lanka to give the public disaster emergency warnings, has been developed in one of the research laboratories. Furthermore, as a leading technical university of Sri Lanka, improving research and innovation capacity has been given high priority in the university development strategies. It remains a main challenge in particular when considering the need to enhance this capacity for the rapid development of the country. The University Corporate Plan and the Strategic Development Plan has many sectors covering these areas and development of a strong Research and Development capability in order to contribute to national development activities. In doing so it is believed that the university will benefit from consultation with national stakeholders and international collaboration with particular reference to sharing experiences and success stories. The Department of Civil Engineering (DoC) at UoM, is one of largest Civil Engineering departments in the country. Due to its large size and expertise in diverse areas, the Department operates under six divisions, all of whom conduct postgraduate taught programmes and research programmes leading to Masters and PhD qualifications. The quantum of teaching, research and consultancy activities handled by the Department perhaps makes it one of the most active Departments in the University. BEACON will be based within this department. During past decade, during many disasters including which were induced by the extreme climate, DoC has played a leading role by providing technical guidance, research innovations and academics chaired many national committees which developed building codes and

national guidelines. After Indian Ocean Tsunami (2004), DoC was instrumental in setting up the International Institute for Infrastructure Renewal and Reconstruction (IIIRR), a multi-university international consortium which provides overall leadership in research, education, planning, design and implementation for mitigation of the impact of natural disasters and infrastructure renewal and reconstruction projects in tsunami affected or underdeveloped regions. DoC has been involved in Disaster Risk Management related activities since 2004 Indian Ocean Tsunami and is heavily engaged in research on early warning systems, risk assessment and mitigation. Moreover, DoC has provided the leadership to develop many nationally important guidelines and building regulations for landslides, floods, tsunamis and storm surges. Furthermore, DoC , has experience in collaborating in many international universities and organizations, funded by ERASMUS+, EPSRC, GCRF, World Bank etc.

Keynote Speakers



Climate change induced displacement and relocation; Learnings to build a resilient coastal built environment

Professor Nishara Fernando

Former Head of the Department of Sociology

Former Director, Social Policy Analysis & Research Centre (SPARC)

Faculty of Arts

University of Colombo

Nishara Fernando is a Professor in Sociology attached to the Department of Sociology of University of Colombo, Sri Lanka. He received his bachelors' degree in Sociology from the University of Colombo and holds a Master of Philosophy Degree in Sociology from the University of Colombo. He also completed his Postgraduate Diploma in Sociology at University of La Trobe, Australia. The basis of his PhD., which he obtained from University of Bonn, Germany, was on the timely cum critical topic of forced relocation following the Indian Ocean Tsunami in 2004. He has contributed immensely to academia as a principal investigator and a country lead for several international sociological and multi-disciplinary research which have been funded by ERASMUS+, Swiss National Science Foundation, UKGCRF etc. and has authored, co-authored, and published many academic publications in the form of books, book chapters and research articles in local and internationally reputed journals during his 24 years of service. His teaching and research expertise cover subject matter related to conflict, development and disaster induced displacement and relocation and resettlement, youth and education, social vulnerability and vulnerability assessments, livelihoods development of urban and rural marginalized groups, community-based monitoring systems and institutionalized children.



Recent contributions of IHCantabria to coastal adaptation

Professor Iñigo J. Losada

Research Director

Scientific Director of the Cantabria Coastal and Ocean Basin

Head of the Climate, Energy and Marine Infrastructure Department

Iñigo Losada graduated with a PhD in Civil Engineering from the Universidad de Cantabria (UC) and a second PhD in Civil Engineering from the University of Delaware (USA). He is Professor and Director of Research of IHCantabria where he served as the founding Director (2007-2011), after co-promoting its creation. From 1989-1992, he joined the Center for Applied Coastal Research (U. of Delaware) working on coastal oceanography, mostly on the understanding and modeling of coastal dynamics and its interaction with natural and artificial structures.

In UC, as an Associate Professor first and as Full Professor (1999), his research has embraced: coastal dynamics and its relation with coastal protection; climate change and coastal risk and the development of ocean energy. From 2000-2004 he served as Director of the Water Science Technology and Environment Department and as a Member of the Scientific Panel for the Strategic Coordination of Marine Spills of the Ministry of Science and Technology, created in response to the Prestige Oil Spill. From 2008-2011 he was the Coordinator of the Spanish National Agency for Research Evaluation and Prospective (ANEP) in the field of Civil Engineering. Since 2012 he serves as Coordinator of the Area of Water and Energy of Cantabria Campus International (CCI), one of the few Spanish Excellence Campus, having obtained the highest recognition by the International Evaluation Panel.



Built Environment Learning for Climate Adaptation (BEACON)

Outline

BEACON (Built Environment leArning for Climate adaptation) is a collaborative research project co-funded by EU Erasmus+ programme. This three-year research initiative aims to develop trans-disciplinary and innovative research-based learning in the built environment to tackle climate change in coastal regions. The effects of the climate change will have devastating effects on the vulnerable coastal built environment as it has the ability of inundating the existing built environment due to direct threats to properties, infrastructures, coastal industries, coastal and marine ecosystems. Furthermore, coastal areas are known to highly populated due to urban centres being located near the coastal belts further increases the predicament. In light of this there is a vital necessity to develop tangible climate adaptation measures in the coastal built environments. However, there is a significant knowledge gap in relation to effective responses and adaptation measures to climate change impacts within the built environment as a whole as well as the construction and property industries. In addressing this it is essential to upgrade the knowledge and skills of the built environment professionals as they will be lead roles in this climate change adaptation process. In light of this the project aims to develop trans-disciplinary and innovative research-based learning in the built environment to tackle climate change in coastal regions and the following objectives have been set out.

- To identify climate change impact on the built environment in coastal regions
- To develop a coherent framework for integrating the requirements of the Paris Agreement with the Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) in the context of the impact of climate change on the built environment in coastal regions'
- To recognise the opportunities for climate adaptation in the coastal built environment in line with the coherent framework
- To understand skills gaps in climate adaptation in the built environment to tackle climate change in coastal regions.
- To develop a trans-disciplinary and innovative research-based learning to improve competencies in climate change adaptation in the built environment in coastal regions.

Project Partners:

- University of Huddersfield, UK
- Lund University, Sweden
- The University of Cantabria, Spain
- University of Malta, Malta
- University of Colombo, Sri Lanka
- University of Moratuwa, Sri Lanka



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Built Environment Learning for Climate adaptation



BEACON aims to develop trans-disciplinary and innovative research-based learning in the built environment to tackle climate change in coastal regions

Climate change is one of the greatest environmental threats affecting all countries with almost no exception. Coastal areas are some of the most vulnerable due to, in addition to changes in temperature, precipitation and more frequent flooding, they are highly impacted by sea level rise and tidal waves, which accelerate coastal erosion. As the built environment demonstrates a high fragility and vulnerability to long-term climate impact as well as extreme hazards, strengthening the coastal built environment with an effective level of resilience is vital if they were to withstand predicted climate change impacts. Although there is an urgent need to translate awareness of climate change impacts into tangible adaptation measures, recent studies have shown that there are significant knowledge gaps in relation to both risks and the effective responses within the context of the built environment.

Levels of preparedness of construction and property industries, in terms of having viable and sustainable adaptation plans to tackle climate change, are lagging behind and unsatisfactory. There is an urgent need for further education, an enhanced knowledge base and skills upgrading in climate change adaptation to reach a resilient and sustainable built environment.

In order to address climate change and build resilience to disaster and climate change impacts, a multi-stakeholder, multi-sector and a trans-disciplinary approach is needed.

Project partners:

University of Huddersfield, UK (Lead)
(Dr. Chamindi Malalgoda, Prof. Dilanthi Amaratunga, Prof. Richard Haigh, Ms. Shavindree Nissanka)

Lund University, Sweden (Prof. Mo Hamza)

University of Cantabria, Spain (Ignacio Aguirre Ayerbe, María Merino González - Pardo)

University of Malta, Malta (Prof. Ruben Paul Borg)

University of Colombo, Sri Lanka (Dr. Nishara Fernando)

University of Moratuwa, Sri Lanka (Dr. Chandana Siriwardana)



Objectives

- Identify climate change impact on the built environment in coastal regions
- Develop a coherent framework for integrating the requirements of the Paris Agreement with the Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) in the context of the impact of climate change on the built environment in coastal regions
- Recognise the opportunities for climate adaptation in the coastal built environment in line with the coherent framework
- Understand skills gaps in climate adaptation in the built environment to tackle climate change in coastal regions
- Develop a trans-disciplinary and innovative research-based learning to improve competencies in climate change adaptation in the built environment in coastal regions

Project Outputs

- A review of the climate change impact on the coastal built environment
- A synthesis report on opportunities and constraints for integrating Paris Agreement with the Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) in the context of built environment in coastal regions
- A comprehensive framework for climate change adaptation in design, construction and retrofitting aligning with SDGs and SFDRR
- Review of the role of the built environment stakeholders in climate change adaptation in the built environment and associated skill gaps and mismatches
- Guidance notes with case studies and good practices on implementing local adaptation strategies in the built environment in coastal regions
- A trans-disciplinary and innovative research-based learning platform in the built environment to tackle climate change in coastal regions and the proposed competency framework
- Development of curricular of the proposed learning platform

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Associated Projects



INCLUsive Disaster Education (INCLUDE)

Outline

Despite some countries launching remote DRR education activities, they have faced a range of challenges and these have been magnified by the COVID-19 pandemic outbreak. The rise of remote teaching and the use of digital platforms has presented challenges to inclusivity and social equity, with a digital divide lowering the academic outcomes of low-income, underserved students and areas. Engagement outside the classroom has also become a challenge and this is a particular concern for practical fields such as DRR. The complexity of these challenges limits our ability to apply generic solutions for DRR education and there is a need for it to be contextualized. Effective teaching and learning strategies are important to increase the effectiveness of DRR activities and increase the inclusivity of disaster education.

INCLUDE aims to reimagine online distance learning education so that it better supports the diverse DRR community. Accordingly, INCLUDE will develop a University-Industry digital learning platform to provide high quality inclusive digital education in DRR. It is expected to achieve the aim via 5 objectives as outlined below. Methods of addressing them are explained against each objective.

- To understand online, distance learning strategies currently used in DRR education and their effectiveness in promoting gender equality and sensitivity and addressing differences in relation to the access and use by underrepresented groups
- To develop a framework to reimagine online distance learning education so that it better supports the diverse DRR community, also addressing both natural and biological hazards and their integration
- To design an inclusive University-Industry digital learning platform to provide high quality inclusive digital education to DRR community
- To explore the opportunities of the use of disruptive technologies in online distance learning education in DRR
- To propose a digital competence framework for educators in building capacity to implement online and distance teaching and learning in DRR

Outputs and impact

INCLUDE begins with identifying the currently available online, distance learning strategies in DRR, their success factors and associated issues and problems (O1). This will help to understand exactly where the gaps in remote learning exist, and how educators are coping, and their predictions for the future. To tackle the problems identified as part of O1, a framework will then be developed to reimagine online distance learning education that can support the diverse DRR community. It will outline different strategies for remote learning which suit different types of content and community groups. These strategies are guided by a concern for equity and inclusion and the need to ensure the design and delivery of distance learning do not exacerbate existing educational and social inequalities. Adopting new digital communication tools will be a key driver of change for strengthening collaborations across greater distances, as remote working has now become the new 'normal'. Based on the framework that will be developed as part of O2, INCLUDE will strengthen university-industry collaboration in DRR in each participant country through the development of a digital learning platform (O3). It directly contributes to the objective of improving the quality of education and the relevance it has for society at large. INCLUDE will build and maintain a robust and sustainable digital learning platform for University-Industry collaboration based on MOOCs (Massive Open Online Courses) principle. The priority of the INCLUDE project is to make student-centred learning more personalised so as to enhance the quality of students' experience, enabling interaction with a wider range of cultures, personal encounters, knowledge systems, and beliefs. Accordingly, as part of the O4, case studies will be developed to explore the opportunities for the use of disruptive technologies [AI, AR/VR, IoT, drones, big data, Robots, blockchain] in online distance learning education in DRR. Validated case studies will then be integrated into University-Industry digital learning platform developed as part of O4 to provide high quality inclusive digital education to the DRR community. INCLUDE will also develop an online research repository with open educational resources (O5). Finally, a digital competence framework (O6) will be developed for DRR educators to help develop digital pedagogical competences which are responsive, adaptable and flexible.

Future tasks

INCLUDE is a two-year research initiative which is ending on the 30th of June, 2023. Therefore, the Outputs have been completed and the project at the current stage is focusing on dissemination activities and ensuring the sustainability of project results and infrastructure.

Project team

- Professor Dilanthi Amaratunga, University of Huddersfield, UK
- Dr. Chamindi Malalgoda, University of Huddersfield, UK
- Professor Richard Haigh, University of Huddersfield, UK
- Ms. Anuradha Senanayake, University of Huddersfield, UK
- Ms. Aravindi Samarakkody, University of Huddersfield, UK
- Professor Champika Liyanage, University of Central Lancashire, UK
- Dr. Ruchira Yapa, University of Central Lancashire, UK
- Mr. Wageesha Rasanjana, University of Central Lancashire, UK
- Ms. Elizabeth Jackson, University of Central Lancashire, UK
- Professor Mo Hamza, Lund University, Sweden
- Professor Artūras Kaklauskas, Vilniaus Gedimino Technikos Universitetas, Lithuania
- Dr. Natalija Lepkova, Vilniaus Gedimino Technikos Universitetas, Lithuania
- Professor Rajib Shaw, Keio University, Japan
- Ms. Tomo Kawane, Keio University, Japan
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Project partners

- University of Huddersfield, UK (Lead)
- University of Central Lancashire, UK
- Lund University, Sweden
- Vilniaus Gedimino Technikos Universitetas, Lithuania
- Keio University, Japan



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Research Training Network on Tackling Climate Change as an Underlying Disaster Risk Driver (CCA-DRR)

CCA-DRR is designed to develop research capacities amongst academic staff members of UK and Sri Lanka, in “tackling climate change as an underlying disaster risk driver”

Climate change can increase disaster risk by altering the frequency and intensity of hazard events, affecting vulnerability to hazards, and changing exposure patterns. Countries such as Sri Lanka have experienced these impacts of climate change, including an increase in extreme weather-related events such as cyclones, droughts, monsoonal rain, and subsequent flooding and landslides. Despite increasing recognition of their links, disaster risk reduction (DRR) and climate change adaptation (CCA) have largely remained distinct and independent in research and policy communities. In order to rectify this, the UN Sendai Framework for DRR 2015–2030 laid out a pathway for DRR that has been adopted by 187 countries, and emphasises “more dedicated action needs to be focused on tackling underlying disaster risk drivers, such as the consequences of climate change”.

Capacity Building

This Network on CCA-DRR will bring together a bi-lateral cohort of UK and Sri Lanka scientists to build capacity that can help to better integrate CAA and DRR. The Network aims to advance the dialogue between the CAA and DRR communities by investigating differences, overlaps and potential synergies between the two realms. It will achieve this through a structured training programme that draws together international expertise and diverse disciplinary perspectives.

Impact

The Network will build the capacity of Sri Lankan Universities to produce high quality, policy and practice relevant research that can support Sri Lanka’s efforts to tackle climate change and its impact on disaster risk. 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
- Prof. Nishara Fernando, University of Colombo, Sri Lanka
- Prof. Ranjith Dissanayake, University of Peradeniya, Sri Lanka
- Prof. Champa Navaratne, University of Ruhuna, Sri Lanka
- Prof. Nandasiri Weerasinghe, University of Ruhuna, Sri Lanka
- Dr. Mohamed Thariq, South Eastern University of Sri Lanka, Sri Lanka
- Prof. S.B. Navarathne, University of Sri Jayewardenepura, Sri Lanka
- Dr. B.G.N. Sewwandi, University of Kelaniya, Sri Lanka
- Prof. Achini De Silva, Sabaragamuwa 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
- University of Sri Jayewardenepura, Sri Lanka
- University of Kelaniya, Sri Lanka
- Sabaragamuwa University of Sri Lanka, Sri Lanka

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Science and Human Factor for Resilient Society — ‘CORE’

Outline

CORE is a project that addresses the need for disaster-resilient societies by focusing on human factors, social aspects, and organizational aspects. It aligns with Horizon 2020’s objective of ensuring secure societies in the face of increasing threats. The project builds upon previous and ongoing initiatives, driven by end-users and their stakeholder networks. CORE aims to leverage best practices and knowledge from countries like Japan, known for their high-risk awareness despite facing seismic and tsunami hazards. By combining European and global expertise, the project aims to provide optimized actions and solutions to rebuild socio-economic structures after disasters, with a focus on vulnerable groups. CORE takes a multidisciplinary approach to define common metrics for different disaster scenarios and develop strategies to measure, control, and mitigate their impact on populations. It emphasizes the need for an integrated systemic approach, delivering tailored interventions that consider the human and social dynamics in affected areas.

The project extends its reach beyond Europe, collaborating with end-users in Israel, India, and Japan to access relevant knowledge bases in those regions. The overall objective of CORE is to develop a harmonized vision of crisis management awareness and capability. It aims to promote efficient disaster risk management and identify and report best practices and procedures to policymakers, end-users, stakeholders, and NGOs. Education, particularly in schools, is a significant focus area for CORE. Training activities aim to raise awareness among young people about the vulnerability of marginalized groups and the importance of communication channels available to them. The project proposes an engaging and contemporary approach, utilizing advanced technologies familiar to the younger generation, with the goal of empowering them as “prevention sentinels.”

Outputs and impact

The overall ambition of the CORE project is to develop a harmonized vision of DRR, crisis management awareness and capability. The project has thoroughly structured its objectives into 10 distinct work packages, each contributing to the development of the envisioned outcomes.

10 work packages:

WP Number	WP Title	Main output
WP1	Project management	Development of a project management plan, data management plan, and a final report on ethical conduct.
WP2	Natural and man-made disaster scenarios	Analysis framework, case study identification and analysis, and a comparative analysis of the case studies.
WP3	Community resilience in selected past crisis	Critical analysis of past disasters, analysis of cultural heritage, risk governance strategy, and development of a community resilience strategy.

WP4	Cascades	Counterfactual risk analysis, comparative analysis and case briefs on preparedness and security of supply, systems dynamics model and policy brief on cascades, risk framework of cascades, and multi
WP5	Human centered disaster preparedness, emergency management, and safety culture diversity	Development of a measurement toolkit for safety culture, report on human centeredness and safety culture diversity among European countries and social groups.
WP6	Risk perception, improving resilience, and dynamic risk	Reports on risk benefit analysis, decision making and resilience, and the role of emerging technologies in enhancing safety culture.
WP7	Social media information/misinformation and risk	Reports on communication patterns, misinformation in social media on risk perceptions, communication in social media and ethical values, stakeholders' preferences on tools, and the development of a tool to fight misinformation on earthquakes.
WP8	Dissemination and crucial stakeholders' engagement	CORE Project Dissemination Plan, report on dissemination and communication activities, and development of the CORE website and online dissemination infrastructure.
WP9	CORE legacy	Policy recommendations, ethical recommendations, and development of the CORE App.
WP10	Ethics requirements	Ensuring compliance with ethics requirements throughout the project.

Future tasks

Project period: 3 years (September 2021 – September 2024)

The project's future tasks focus on crucial aspects of disaster resilience and safety. This includes a comparative analysis of natural and manmade disaster case studies, identifying trends and common themes using specialized analyses like social media, cascade effect modelling, and aerial imagery. The aim is to extract valuable insights for effective disaster management strategies. Another key task is developing a community resilience strategy, emphasizing the importance of increasing risk awareness among people and decision-makers in Europe. By fostering a culture of preparedness, the strategy aims to enhance society's ability to cope with diverse hazards. The project will conduct a comprehensive multi-risk analysis, examining cascading effects and hazard interactions. This analysis will provide a deeper understanding of managing and mitigating interconnected risks.

Additionally, a report will be generated on human-centred disaster preparedness, emergency management, and safety culture diversity in European countries, the UK, Israel, and various social groups. It will present the results of safety culture surveys and assessments conducted within the CORE projects, offering insights into the effectiveness of disaster management plans and operations. The project will also explore the role of emerging technologies in enhancing safety culture. A report will highlight the potential contributions of these technologies to disaster risk reduction, seeking ways to leverage advancements for improved preparedness and response. Lastly, an AI tool will be developed to combat misinformation about earthquakes. This tool, powered by AI algorithms, aims to address the spread of false information, enabling more accurate and reliable communication during seismic events. Through these tasks, the project aims to advance disaster management knowledge, foster resilient communities, harness emerging technologies, and promote accurate information dissemination for effective risk reduction and response.

Project team

- Professor Dilanthi Amaratunga
- Professor Richard Haigh
- Mr Malith Senevirathne
- Ms Georgina Clegg

Project partners

- University of Salerno (UNISA), Italy
- Institute for Sustainable Society and Innovation (ISSNOVA), Italy
- Eidgenössische Technische Hochschule Zürich (ETHZ), Switzerland
- International Institute for Applied Systems Analysis (IIASA), Austria
- University of Huddersfield (HUD), UK
- Hanken School of Economics (HANKEN), Finland
- Saher (Europe) OU (SAHER), Estonia
- Public Safety Communication Europe Forum (PSCE), Belgium
- Institut de Science et Ethique (ISE), France
- College of Law and Business (CLB), Israel
- Mto Safety AB (MTO), Sweden
- Sixense Engineering (RESALLIENCE), France
- Euro-Mediterranean Seismological Centre (EMSC), France
- Italian National Fire Corp (INFC), Italy
- Italian Red Cross- Branch of Vincenza (CRI), Italy
- Ufficio Comune per la sostenibilità ambientale- Joint Office for Environmental sustainability (UCSA), Italy
- University of Applied sciences for public service in Bavaria (HFOD), Germany
- Austrian Red Cross (AusRC), Austria
- Ministry of Culture, Italy

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Book of Abstracts

Introduction

This section contains all abstracts being published and presented at the international symposium on Climate Change Adaptation in the Built Environment.

Authors were invited to submit abstracts that address the Symposium themes:

- The governance framework for Climate Change Adaptation in the built environment.
- Climate Change Adaptation in the built environment and land use planning.
- Communicating Climate Change Adaptation
- Climate Change Education

Abstracts address the approach, results, concepts, and applicability of the research studies conducted in the field of climate change adaptation in the built environment. In addition to welcoming the more traditional peer reviewed research paper, we also invited the submission of abstracts for policy and practice notes. All abstracts have been double blind refereed for quality, originality and relevance by the Scientific Committee.

Authors of selected abstracts will be invited to prepare full papers for the Springer Book Volume titled: 'Climate Change Adaptation in the Built Environment-Transdisciplinary and Innovative Learning'. The book is edited by Dr. Chamindi Malalgoda, Prof. Dilanthi Amaratunga, Prof. Richard Haigh, Ms. Shavindree Nissanka, Prof. Nishara Fernando, Prof Ruben Paul Borg and Prof. Mo Hamza.

Topic 1:

The governance framework for Climate Change Adaptation in the built environment

Including, but not limited to:

- Regulatory and institutional frameworks.
- Integration of the Paris agreement, SDGs, and Sendai Framework in the context of the coastal built environment.
- The role of built environment stakeholders in addressing climate change.
- Role of professionals in tackling climate change adaptation.
- Knowledge and skill gaps in addressing climate change in the built environment.
- Climate change competencies for the built environment.

Coastal Adaptation in California: Experiences, Successes, Challenges and the Way Forward for Effective, Equitable Implementation

Borja G. Reguero*¹, Charles Lester², Adam Young³, Crissy Pickett¹,
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Abstract

California's coastal communities face increasing impacts and costs from sea level rise, erosion, flooding, and other coastal hazards. Across the State, approximately 6% of the state's Gross Domestic Product is at risk of flooding from future sea level rise and a 100-yr storm (Barnard et al 2019).

California is at the leading edge of impacts of climate change, but also in developing solutions to address them, and aiming to do so in a sustainable and equitable way. Adaptation of coastal zones is of the highest priority: state Agencies and local communities have been scaling up adaptation efforts, leading innovative policy, planning and innovation across spatial scales, such as the new Climate Adaptation Strategy, which outlines six specific outcome-based resilience priorities to guide actions to protect vulnerable communities, the economy, and nature from climate change. Governor Newsom's Executive Order N-82-20 also calls for accelerated efforts to increase adaptation and resilience by expanding nature-based solutions. Equity and justice factors are also becoming central parts of the process, as pre-existing socioeconomic inequities are being aggravated by climate impacts.

Despite the bold and decisive steps in climate change planning, the approach, implementation status, science use, and degrees of successes varies significantly between communities and regions. The goal of this talk is to share the outcomes from a review of the status, processes and challenges faced in California in coastal adaptation. We will also outline the critical knowledge and technological gaps and recommend an actionable roadmap for solutions-based science that could most effectively help advance implementation. The work is the result of a University of California's multicampus initiative and is based on workshops, literature and policy reviews, case study analysis, meetings with experts, and analysis of local plans. The analysis presents a pathway for expanding partnerships and targeted collaboration between universities and communities.

The Cultural Landscape of Portovenere, Cinque Terre, and the Islands in Northern Italy: How to Tackle Climate Change in the case of a Coastal UNESCO Site

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Abstract

Portovenere, Cinque Terre, and the Islands (Palmaria, Tino and Tinetto) is a UNESCO World Heritage site nominated in 1997. Located in the North of Italy in the Liguria Region, it is a coastal cultural landscape which includes several villages built on cliffs and shores, as well as steep terraced and cultivated areas. It is subject to several hazards (floods, landslides, droughts, etc.), and climate change risks are expected to exacerbate in the coming years.

This intervention wants to unfold the governance framework, strategies and actions that the UNESCO site is putting in place to tackle the climate change consequences. A set of diversified actions is needed to ensure the protection of the universal values which have led to the inscription of the site in the WHL (World Heritage List).

The outstanding universal value (OUV) of Portovenere, Cinque Terre, and the Islands consists of some physical attributes (the unique landscape, terraces with dry stone walls, its traditional cultivar - vineyards and olive trees, its villages and coastal landings), as well as immaterial aspects (the human capital, the passing-on of oral traditions, the agricultural and dry-stone walls maintenance know-how). All these attributes are seriously threatened by Climate Change impacts, such as flooding, extreme rainfalls, forest fires in the summer season. Therefore, the UNESCO site management board has been planning and implementing some actions to contrast CC threats, which include:

The activation of the measures and projects foreseen in the UNESCO Management Plan, which has been carefully edited to ensure the protection and enhancement of the site's universal value (actions range from education on agricultural and maintenance practices to the young generations, mitigation of the tourism's negative impacts, to physical interventions for the stabilization of the slopes);

The Disaster Risk Management Plan implementation, which identifies the risks which could occur, the governance structure in case of disasters, communication strategies for prevention towards both tourists and residents.

Studies on the Tourist Carrying Capacity of the site, to avoid the overexploitation of natural resources, the loss of human capital and resident population, as well as the impacts on the landscape and the waste management system in relation to the very high (and increasing) number of tourists which visit this fragile site every year.

Participation to international projects (HEU RESCUEME, Life+ Projects), in order to support the further development of research and innovation to contrast CC impacts.

The UNESCO site represents an interesting example of how a coastal cultural landscape can mitigate the impacts and adapt to the climate change issues that will affect it in the future. The fact of being recognized in the WHL puts more emphasis on the need to protect such a landscape and has led the local authorities to develop specific measures that could be taken for inspiration and

example also in many other coastal areas in Southern Europe. Strategies and actions proposed in the UNESCO management plan vary from the local level to the European one: they encompass agreements with scientific institutions (Research foundations and universities), collaboration with the local communities (information and dissemination), support to the local stakeholders (help to agricultural stakeholders), as well as actions to maintain territorial strength and stability (Terraces, rivers, forests, etc.). Methods and actions to manage risks (Disaster Risk Management Plan) have been put in place, and participation in climate change related international projects (such as Horizon Europe, LIFE, etc.) is feeding the local strategies for climate change adaptation.

Key words: *Cultural Landscape Protection, Disaster Risk Management Plan, Education, Extreme Events, Know-how, Tourism, World Heritage List*

Evaluation and Diagnosis of Adaptation Measures to Minimize the Climate Change Impacts on the Beach of Zarautz (Basque Coast, Northern Spain)

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Abstract

Climate change is escalating the coastal threats. However, there is still time to avoid or limit some of the impacts if proper coastal management strategies are conducted. This situation is particularly relevant on urban beaches where the potential to counteract the effects of climate change in a natural way is limited. It is the case of Zarautz (north of Spain), a laterally constrained urban beach exposed to a very energetic wave regime. The aim of this work is to collect, propose and analyze adaptative solutions that can be applied along the rigid contours of Zarautz beach to counteract the climate change derived effects, based on the premise that the element to be preserved is the beach, maintaining as far as possible the current characteristics of the sandy area, in terms of morphology and compatibility of uses. Here we propose a battery of possible solutions classified as; i) Prevention (tools that act on the management apparatus), ii) Protection (rigid defense structures to protect both the beach and the urban environment) and (iii) Preparation (improvement of alert system protocols). However, in the initial phase we prioritize the action on the rigid contours, focused on the reduction of the wave reflection at west lateral contour and on the seawall of the beach where an alongshore non-uniform seawall setback and crest level elevation is proposed, as well as the disposition of dissipative structures. Finally, this work highlights the relevance of citizen participation, the need of collaboration between different administrations in defining solutions and the utility of territorial planning as a tool to improve the conditions that allow the adaptation of the territory to future threats.

The action DC.6.1.1.7 Diagnostic report and evaluation of options to minimize the damage that the combined effect of waves and tides produces on the Zarautz waterfront, is part of the European Union Integrated LIFE Project UrbanKlima 2050, for the implementation of the Basque Country Climate Change Strategy - KLIMA 2050. The Zarautz City Council is the promoter of this action.

Skill and Knowledge Gaps in Climate Change Adaptation- A Case of Sri Lanka

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Abstract

Climate Change is a contemporary issue which is discussed in many policy documents and global-level forums due to its significant impacts on the built environment. Therefore, implementation of climate adaptation measures is a timely need though it is questionable whether built environment stakeholders and professionals are well equipped to execute Climate Change Adaptation (CCA) measures. This study aims to (a) identify key built environment stakeholders in Sri Lanka (b) identify key challenges faced (c) identify key skill and knowledge gaps that hinder CCA and (d) propose a competency framework to address the said gaps. Key built environment stakeholders were identified through a secondary data review. Primary data was collected by employing a semi-structured interview with 40 purposively selected built environment experts. Data was analyzed using thematic analysis. Findings were validated through a focus group discussion. The study identified five major built environment stakeholders including the government and private sector, Non-Government Organizations, academia, and the general public that work towards CCA. Each group face different personal and organizational challenges including complications created by bureaucratic red tape, lack of resources, uncompetitive and inadequate remuneration in the state sector, lack of training opportunities, and political interference. Key knowledge and skill gaps include communication skills, technical skills, language skills, climate change mitigation and adaptation knowledge, knowledge on research and investigation, etc. The BEACON project proposes a competency framework as the seventh output of the project consisting of three major tiers for all built environment practitioners to address these gaps. This paper divulges key built environment stakeholders in CCA, key challenges, and skill and knowledge gaps. It also suggests a competency framework to bridge these gaps to enhance CCA outcomes.

Keywords: *Climate Change Adaptation, Skills and Knowledge Gaps, Challenges, Sri Lanka, Competency Framework*

An Integrated Approach to Improve Urban Resilience and Climate Actions via Adopting Nature-Inspired Solutions (NIS) With Community-Based Observing Networks (CBON) - Lessons Learnt from Urban Planning Approaches in Japan

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Abstract

Japan is a renowned country for having a rich cultural heritage, also a country which is highly exposed to a wide range of natural hazards. According to the INFORM Global Risk Index 2019, Japan is one of the highest vulnerable nations in the world. Therefore, Japan has identified potential avenues where cultural knowledge is used to develop solutions to mitigate the risk of natural hazards including climate actions. One of the successful actions is incorporating the CBON which is an indigenous scientific approach to monitor environmental changes with NIS such as slime mould behaviour patterns to produce multi-objective urban planning strategies. By integrating indigenous knowledge and environmental studies, Japan has developed a unique approach that emphasizes the role of community involvement in sustainability and resilience. Under this viewpoint, the CORE (Science and Human Factor for Resilient Society) project funded by the Horizon 2020 program investigates the state of the art within such complex characteristics, to develop a harmonized resilience approach for strengthening the multi-hazard risk management capacities of Europe countries. This paper aims to highlight Japan's best practices of CBON and NIS in developing multi-objective urban planning solutions, which provide a promising way forward for climate action. This research explores the CBON approach which generates comprehensive data on environmental variables and successful applications of NIS in Japan's urban planning problems via reviewing published sources. The integrated CBON and NIS approach can be used to monitor the impact of ecological and anthropogenic activities on environmental changes providing a foundation for designing deployment strategies that respond to different paces of urban dynamics. This provides a comprehensive understanding of the cultural and urban environs, enabling them to recall events precisely and describe changes accurately. This approach can create more sustainable and resilient urban solutions by bringing community agents together with professional practitioners, in Japan and the world.

Keywords: *Climate Change, Community-based Observing Networks, Community Resilience, Nature-Inspired Solutions, Urban Planning*

Role of Built Environment Stakeholders in Climate Change Adaptation

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Abstract

Recent evidence confirms a close liaison between natural and human-induced hazards and the built environment, as the built environment demonstrates a high fragility and vulnerability to hazardous situations. Accordingly, the built environment stakeholders must be well informed and capable enough to address the climate change adaptation needs. Thus, it is essential to identify the built environment stakeholders' role in climate change adaptation measures.

The study investigates the built environment stakeholder's role under six different stakeholder categories: National and Local governments, The Private Sector, Academia and Research Organizations, Civil organizations and Professional Bodies and Community. The data has been collected by country level contextualizing studies using both secondary and primary data. A case study approach has been used and primary data has been collected through expert interviews from stakeholders representing the above categories in five different countries: United Kingdom, Spain, Malta, Sweden and Sri Lanka.

Synthesizing the findings, the results reveal the key roles and sub roles for the different stakeholder categories in climate change adaptation in the built environment. While demonstrating the role of built environment stakeholders in more descriptive manner the study facilitates the country level comparison of the roles and responsibilities of the different stakeholders.

Keywords: ***Climate Change, Built Environment, Stakeholders, Roles and Responsibilities***

Challenges in Integrating the Paris Agreement, Sustainable Development Goals, and Sendai Framework into Coastal Built Environments: A Review of Sri Lankan Context

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Abstract

Coastal zones of Sri Lanka are highly vulnerable to the impacts of climate change, including sea level rise, extreme weather events, and coastal erosion. The Paris Agreement, Sustainable Development Goals (SDGs), and Sendai Framework emphasize the importance of coastal climate adaptation and risk reduction strategies, such as risk-sensitive development planning, early warning systems, and community engagement. Policy gaps and needs assessments are crucial for implementing adaptation and loss and damage measures in the context of the National Adaptation Plan.

This study aims to review the challenges faced by Sri Lanka in implementing the global agendas of the Paris Agreement, SDGs, and Sendai Framework, and provide recommendations to assist policymakers and stakeholders in advancing these goals. A comprehensive literature review approach was employed, utilizing country reports as the main source of information. The literature review allowed for an analysis of challenges and progress in implementing the global agendas in Sri Lanka. Sri Lanka has integrated these three global agendas into its climate change adaptation policies and initiatives, but significant obstacles to implementation remain. Limited availability of climate and socioeconomic data hampers planning and decision-making processes, and inadequate climate-related regulations and standards hinder the effective implementation of adaptation measures. Improved collaboration and coordination among stakeholders, as well as adequate financial and technical resources, are essential to achieve the integrated approach required by these global goals. Sri Lanka has made progress towards these global climate change agendas, but implementation challenges persist. Adaptation projects should focus on addressing local phenomena, and an integrated approach to the three agendas is vital. Sri Lanka must fulfill its commitments to ensure a sustainable future. Sri Lanka is integrating the three global agendas into its climate change adaptation policies and initiatives. However, significant challenges remain, including data shortages, inadequate regulations, and coordination issues. Recommendations for advancing these goals include updating laws and regulations, enhancing collaboration among stakeholders, prioritizing education on climate adaptation, and focusing on local phenomena in adaptation projects.

Keywords: *Coastal Climate Adaptation, Global Climate Agendas, Implementation Challenges, Sri Lanka, BEACON*

Topic 2:

Climate Change Adaptation in the built environment and land use planning

Including, but not limited to:

- Climate change impact the coastal built environment.
- Challenges in implementing climate change adaptation measures in land use planning.
- Adapting the coastal built environment to climate change.
- Mainstreaming climate change adaptation within the land use planning and construction process.
- Building efficiency and building codes related to climate change adaptation.

Innovation Actions for Marshes Recovery in the Txingudi Bay to Increase Climate Resilience

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Abstract

Txingudi Bay is located in a transboundary conurbation of 95,000 inhabitants in the Bidasoa estuary, a highly anthropized area of unique marshes. Since the 90s the local and regional authorities work on the recovery of the area, approving in 2015 the Master Plan for the improvement of the connectivity of the estuary marshes and the connection of spaces belonging to the Natura 2000 Network.

The analysis of vulnerability, risk and adaptation of the Basque Country's coast against climate change, carried out in 2022 (Kostaegoki, Ithobe 2022), shows the floodability of a significant part of the urban surface of The Bay nowadays, which increases under the different IPCC sea level rise scenarios at the middle and end of the century. In order to reduce the impact of coastal flooding some restoration actions are planned in the master plan of Txingudi Bay together with the financing of the European project Regions4climate (R4C), aiming at i) improve estuarine ecosystems, ii) increase resilience to coastal phenomena of sea level rise and waves and iii) increase carbon capture.

Another objective is the deployment of the Basque Mission to climate change where the active involvement and opportunities for both public and private agents will be sought, with special focus on SMEs. The aim is to implement nature-based restoration interventions, monitor their effects and involve all local and regional agents in the process. Restoration of degraded areas dedicated to agriculture or other uses and that were previously marshes will consist of excavation and removal of the agricultural soil to return them to their original condition and restore the tidal dynamics.

Monitoring system with different innovative techniques to study the dynamics of the estuary before and after the interventions. The monitoring system includes bathymetry, videometry and carbon capture measurement techniques. Results are expected to be obtained within the next 5 years and drawing conclusions that can be extrapolated to other estuaries.

Evaluating the Impact of Climate-Induced Flooding on the Coastal Built Environment Using FReSMo

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Abstract

Built-environment resilience is crucial for human survival. Reoccurring exposure to tidal waters due to climate-induced sea-level rise is causing a detrimental impact on coastal sustainability, especially within South-east Asia. The South-east Asian population suffers disproportionately due to several reasons such as relative sea level rise (RSLR), the prevalence of poverty, densely populated low-lying coastal regions and an overall shortage of resources that prevents the government and people to invest in building level climate resilience. The IPCC 6th Assessment Report considers Nature Based Solutions (NBS) as the optimal choice for resource-crunched developing countries. However, the uncertainty regarding its cost-effectiveness as a spatial intervention for climate change adaptation restrains its usability. Hence, the proposed methodology aims to highlight the efficacy of NBS in reducing climate change impact on built infrastructure by using a FReSMo modelling framework.

Sagar Island, India is chosen as the case study area given the socio-economic condition, the intensity of RSLR and the island being the refuge station for climate-induced migrations along the West Bengal coastline. The Flood Resilient Scenario Modelling (FReSMo) consists of an experimentally derived multivariate damage matrix that eliminates the constraints of building damage assessment procedures due to the lack of empirical datasets in developing nations. The matrix further estimates pixel-level damage information for SSP 2.6 and 100-year return period flooding using a high-resolution dataset for the present and predicted built-up scenario for the year 2050. The built-up prediction is carried out using a patch-growing algorithm-based FUTure Urban Regional Environment Simulation (FUTURES) model that is analysed in pre-and post-mitigation damage-scenario. An investment in establishing a 100-meter patch of mangroves around the island periphery results in a 222% benefit as it reduces the flood damage cost by 70 to 75% for 48 and 24 hrs flood durations respectively.

Keywords: *Building Damage Assessment, Coastal Flood Exposure, Flood Damage, FUTURES, Nature Based Solutions*

A Systemic and Integrated Vision to Adapt La Pineda Waterfront

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Abstract

Tarragona Port Authority has been nourishing La Pineda Beach (Tarragona, Spain) during the last two decades as an environmental requirement. However, the beach is still far from its equilibrium due to the scarcity of suitable sand. The objective of this study is to find an innovative long-term solution, with a systemic and integrated vision of the waterfront, and to stabilize La Pineda beach, in the context of global climate change and the Port and City Development Plans. Coastal dynamics, historical shoreline evolution, coastal interventions, urban development, habitats, and land uses in this area have been analyzed to propose adaptation measures in line with the Sustainable Development Goals (SDGs). Several adaptation options have been explored including MA1) reducing exposure with flood defenses. MA2) accepting the impacts and managing shoreline retreat, MA3) advancing shoreline with sand or structures. All these measures include the redesign of mobility in the area and the creation of lagoons and wetlands to reduce the sand volume, increase biodiversity and provide new recreational and leisure areas. These measures have been discussed with the most relevant stakeholders and a future solution combining measures MA1, MA2, and MA3 with nature-based solutions has been approved. This consensual solution not only stabilizes and protects the waterfront tackling sand shortage but also contributes to the recovery of habitats, the improvement of biodiversity, and increases social uses, therefore it is expected to be a tourist attraction. Final solution includes living breakwaters, a pool to provide a new social use, lagoons to increase the biodiversity, a bird interpretation center, a dune cordon to protect this environment from the recreational use of the beach and wooden walkways to allow controlled itineraries around this area. Lastly, the new counterdike will be socially integrated with an emblematic square and the generation of different atmospheres and landscapes. This study reflects that a feasible and sustainable solution requires an integrated vision (physical, social, environmental, and economic) of the study area and the involvement of stakeholders in the decision-making process.

An Adaptation of Bruun's Rule to Assess Shoreline Retreat due to SLR in Different Coastal Environments and its Application to the Andalusian Coast (Spain)

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Abstract

The analysis of coastal forecasting in relation to climate change is fundamental to a wide range of long-term coastal management studies. However, most of these studies still use the same empirical methods and outdated equations, such as Bruun's Rule, which has been systematically applied to conditions that deviate from its original hypothesis.

A new formulation for predicting long-term coastal retreat due to sea level rise (SLR) has been developed, based on Bruun's Rule as the initial approach. This formulation has been extended including several factors that were not previously considered by Bruun's Rule, such as: the presence of dunes or seawalls on the back of the dry beach profile, rocky morphologies in the submerged profile, long-shore net erosion and the sediment requirements to maintain estuarine equilibrium inlets, in urbanized and natural coastal areas. This new formulation has been tested and validated on the Andalusian coast and its reproducibility is feasible in other coastal regions with similar characteristics. However, there are some limitations, especially in highly anthropized areas that do not represent the typical patterns of a normal beach profile.

The results predict erosion of 25 meters or more along most of the Andalusian coast by 2100 in the worst-case scenario, while only 1.3% of the beaches analysed are expected to experience shoreline accretion by that time. The results suggest that appropriate measures should be taken in this coastal area, as a large part of the area studied is at risk of significant erosion in the coming decades.

In this context, one of the main objectives of this work has been to provide practical and modular tools for long-term coastal prediction due to SLR, allowing the identification of longshore sediment trends. The empirical approximation and tools have been developed to provide decision-makers with tools with dynamic implementations that extend the useful timescale of these management tools and benefit competent authorities in coastal management to make scientifically informed decisions on how to manage and mitigate those impacts and, in some cases, propose adaptation measures.

Coastal Flood Risks and the Business Community: Stakeholders' Perception in Malta

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Abstract

Resilience of coastal communities is increasingly required to adjust to the effects of climate change and its coast-related threats. Climate change is a major global threat to the environment, economy, and health of urban coastal lowlands. Flooding risks from both rising sea levels and increases in the frequency and severity of storm surges are considered to be amongst the most threatening consequences associated with climate change. The aim of this study was to assess the levels of socio-economic preparedness of low-lying urbanized towns in Malta for the impacts of coastal flooding through the triangulation of stakeholders' participation from three sectors: the business community, local councils, and specialized experts from the governmental and private sectors. The study also included field collection of elevation data for each locality to capture the businesses' distribution in relation to their height above sea level along the urban waterfront. One-way analysis of variance and NVivo were used to test and compare the business owners' responses and the experts' feedback, respectively. The main findings from the business community suggest that there are no long-term contingency plans or strategies in place to address potential flooding impacts from rising sea levels and storm surges, and that the risks of driving owners out of business is high. From the feedback received by the local councils, it was observed that all of them significantly lack the physical and financial resources to effectively manage long-term coastal flooding within their locality, forcing them to completely rely on central government for any future needs caused by the impact of coastal flooding. From a central government perspective, it seems that all interviewed experts operate within a fragmented governance model, and mainly adhere to the set of responsibilities aligned with their respective roles within such a governance model. This evidence of governance disconnect requires more horizontal and vertical integration of cross-sectoral strategies to address coastal flooding, within the broader framework of integrated coastal zone management as established by the Mediterranean ICZM protocol.

Guidance Note on Implementing Local Adaptation Strategies in the Coastal Built Environment

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Abstract

The effects of climate change in coastal areas, such as sea level rise or increased frequency and severity of extreme events, will increase the negative impacts on the physical, economic, social, environmental, and governance components of the built environment. Coastal complexities and uncertainties associated with climate change make the planning and implementation of climate change adaptation strategies a major challenge for local managers and professionals.

Given the recognition that there is a necessity not only to mitigate the causes of climate change but also to adapt to its effects, the aim of this work is to provide guidance to support the implementation of local climate change adaptation measures in the coastal built environment.

To this end, a research analysis and participatory validation process involving key stakeholders from all participating countries in BEACON project (Spain, Sweden, Sri Lanka, United Kingdom and Malta) has been carried out through 96 interviews. This guidance note presents general top tips to implement coastal adaptation strategies, instruments available to support local adaptation to climate change (regulatory, financial, existing strategies, datasets, guidelines etc.) in all target countries, and more than 30 examples of actions undertaken by communities and government agencies worldwide. All of this can be useful in inspiring others to consider the potential in their community and the possibility of implementing successful case studies on climate change adaptation in other places where it is needed.

Furthermore, during the interviews, the suitability of different types of adaptation options in urban coastal zones was analyzed according to the IPCC classification, considering the existence of a regulatory framework, social acceptance for the implementation of a given category of adaptation options, and other factors that may enable or hinder their implementation.

Keywords: *Climate Change Adaptation, Impacts, IPCC Classification*

Can the Nature Inspire to Enhance Disaster Resilience in Coastal Regions?

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Abstract

Coastal zones are highly vulnerable to various natural hazards, including storm surges, tsunamis, coastal erosion, and coastal flooding. Such hazards can have a devastating impact on coastal communities around the world and are responsible for many deaths and loss of livelihood. A range of interventions has been developed to address such threats, including hard and soft engineering and early warning systems. These have effectively reduced disaster risk in many cases but often fail to protect communities, as evidenced by the increasing number of people affected and levels of economic losses. A variety of nature-based approaches have also been promoted in global policy agendas for disaster risk reduction (DRR) in coastal regions, including the Sendai framework for disaster risk reduction 2015-2030, which provides an opportunity to integrate Nature Based Solutions (NBS) into national and local disaster risk reduction strategies. Although there has been growing interest in NBS for DRR, there is less attention on using Nature Inspired Solutions (NIS) for coastal hazards despite its effectiveness in addressing other societal challenges. Therefore, this research aims to investigate the potential application of NIS in reducing the impact of coastal hazards and identifying the barriers and enablers. Accordingly, based on a comprehensive research methodology of a systematic review (Scopus, Science Direct, and Emerald), semi-structured expert interviews (12) and a focus group discussion (27 participants). The study findings reveal that natural coastal systems, such as Coastal Dunes Systems, Barrier Islands, Root Systems of Coastal Plants, Natural Rock Pools, and Living Shorelines, have adapted over billions of years to different coastal hazards and can serve as inspiration for designing resilient coastal infrastructure using native marine organisms. The challenges of using NIS for coastal DRR can be categorised into ten thematic areas. Some challenges are institutional and policy set-up supporting NIS for DRR, raising awareness and ongoing support for the industry sector and professional bodies, and incorporating NIS with higher education. Further, this comprehensive study provides future researchers with a detailed understanding of the state-of-the-art and the potential application of NIS with future research needs to reduce the impact of coastal hazards.

Keywords: *Nature Inspired Solutions, Coastal Hazards, Challenges*

Skill Gaps in Climate Change Adaptation in the Built Environment in Coastal Regions

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Abstract

Climate change is imposing new challenges to the built environment which in turn can play a significant role in the societal shift towards sustainable living as a means to address climate change adaptation. The adaptation strategies to address climate change through the built environment depend on the professionals and workers in the sector. The built environment and construction sector is dynamic in different aspects, including the introduction of innovative building materials and systems and the challenge offered by the changing context related to climate change itself. Existing knowledge and skill sets may not necessarily address the new challenges within the built environment and new skill gaps emerge jeopardizing the effectiveness of strategies and policies to adapt to climate change. The aim of this paper is to identify skill gaps and mismatches in climate change adaptation in the built environment in coastal regions with reference to five countries: Malta, Spain, Sri Lanka, Sweden and United Kingdom. This study was developed in the BEACON - Built Environment leArning for Climate adaptation Project (Project Number 2018-1-UK01-KA203-048231).

The data was generated through a mixed-method approach. Interviews and surveys were conducted among leading stakeholders in the participating countries. The participating partners adopted the most suitable data collection method considering their specific context but with reference to the same framework. Guiding questions of the interviews and the survey were provided to allow comparability of the data generated. Participants were asked about their initial professional training and continuous professional training and how this training supports them in addressing climate change adaptation strategies. Participants had to identify how climate change affects the local market for professional services and any skill gaps within the profession and other stakeholders in the sector.

The skill gaps and challenges identified in the five participating countries reflect the different operational strategies and complexities which are also determined by the impact of climate change in the different geographical contexts. Notwithstanding these differences the five participating countries face similar challenges including the need to improve collaboration and communication between stakeholders, the effective use of resources and the lack of skilled workers.

Climate Change Adaptation Measures for Addressing the Climate Change Impacts within the Coastal Built Environment

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Abstract

The vulnerability of the Coastal Built Environment (CBE) to the adverse effects of climate change is a significant concern for built environment professionals. As a result, Climate Change Adaptation (CCA) has become a critical focus of discussion in this field. The purpose of this study is to identify and evaluate CCA measures applicable to the CBE in the areas of physical, economic, social, environmental, governance, and institutional aspects. The study aims to determine applicable CCA measures for the CBE and identify the most suitable life cycle stage for implementing physical CCA measures and to establish the linkage between CCA measures and climate change impacts on the CBE and evaluate their alignment with global agendas for CCA.

A systematic literature review identified 43 CCA measures for the CBE, and a survey among 32 built environment professionals from Malta and Sri Lanka validated their applicability. A qualitative approach was used to assess their alignment with global agendas, including the Paris Agreement (PA), Sendai Framework for Disaster Risk Reduction (SFDRR), and Sustainable Development Goals (SDGs). Measures for physical assets include design for anticipated loads, risk-informed approaches, greener materials, and future modifications. Economic assets can benefit from resilient infrastructure and increased protection. Social assets can be safeguarded through accessibility and safety drills. Environmental assets can be managed through monitoring, adaptive management, and recovery plans. Governance measures include information sharing, stakeholder roles, policy review, and capacity building. All CCA measures align with the scopes of either PA or SFDRR, and hence with the SDGs. The identified physical impacts were linked with the most appropriate life cycle phase.

This study identified tangible CCA measures for the CBE, evaluated their applicability, and assessed their alignment with global agendas. The findings emphasize the importance of proactive measures to mitigate climate change impacts on physical, economic, social, and environmental assets, and the need for effective governance and coordination.

Acknowledgement: This study was carried out as a part of the Built Environment Learning for Climate Adaptation (BEACON) project. The Authors would like to acknowledge all the partner organizations of the BEACON project and funding agency.

Keywords: *Climate Change Adaptation Measure, Coastal Built Environment, Life Cycle Phases, Global Climate Agendas, BEACON*

Feasibility Study for Integrated Coastal Management of Playa Sosúa, Dominican Republic

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Abstract

The Dominican Republic's coastline is home to 64% of the total population, being a key element for the country's economy. Several studies have revealed that a significant part of the coral reefs has degraded or disappeared, reducing their capacity to protect the coast and increasing erosion rates. The erosion has meant that some beaches have seen major shoreline retreats, putting at risk the coastal areas. This problem is expected to be aggravated because of climate change effects. Furthermore, this study focuses on the feasibility analysis for integrated coastal management of the littoral zone of Sosúa.

A detailed study of marine and coastal dynamics was carried out using reanalysis data and numerical models of wave and current propagation. This has made it possible, on the one hand, to understand the patterns of wave/hurricane and tsunami behavior, as well as the currents that govern the morphology of the different study beaches and, on the other hand, to characterize the maritime climate near the coast. A functioning morphodynamic model of the coast of Sosúa was defined, where it has been shown that due to multiple causes such as the lack of sand supply that historically provided the reefs, have led to an imbalance and disequilibrium in the beaches. Given the current morphodynamic model, this study has defined lines of action to address the erosion problem and thus stabilize the coast.

This study has revealed highly active sedimentary dynamics in the littoral zone of Sosúa and exhibited the fundamental role of coral reefs. The corals represent one of the main sand sources, and their spatial distribution and configuration determine the waves and current system offshore and close to the beaches.

Applicability of Equilibrium-based and Reduced-complexity Models on Coastal Management and Climate Change Adaptation

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Abstract

Shoreline position and variability are important proxies for coastal erosion management and adaptation. Equilibrium-based shoreline evolution models (EBSEM) and reduced complexity shoreline evolution models (RCSEM) are significant tools for predicting their behavior and evolution.

Such models are applicable to a variety of coastal environments, from sandy beaches to rocky shores, and can be used to predict mid to long-term changes in the shoreline due to natural or human-induced factors. They take into account key physical processes such as wave climate, sediment characteristics, and beach morphology, and can be easily calibrated and validated using a wide range of field data, rather than relying entirely on data availability. One of the main advantages of EBSEM and RCSEM is their ability to provide insight into the relative importance of different factors influencing shoreline change over time, allowing the assessment of shoreline responses from storm to sea level rise timescales. Their versatility, computational efficiency, and multiscale range can be used to predict shoreline behavior under different scenarios, exploring how different sediment management strategies or climate change scenarios may affect shoreline evolution over decades or even centuries.

In this study, we present an overview of several EBSEM and RCSEM, calibration/optimization methods, and applications over different environmental systems. A brief comparison of three EBSEM and results derived from its applications is presented, presenting root mean squared errors lower than 5.5 m and Pearson's correlation between 0.5 and 0.65, meaning moderate to strong correlation. Decision makers and stakeholders need to consider probabilistic and deterministic approaches to better understand coastal behavior. All these models' characteristics have led several researchers to make efforts to improve their predictive capacity and range of applicability. These efforts need to be increasingly integrated into coastal planning and climate change adaptation strategies.

Keywords: *Shoreline Evolution Models, Beach Morphology, Climate Change, Erosion Management*

The Role of the Saltmarshes as Nature-based Solutions for the Climate Change Adaptation in European Atlantic Estuaries

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Abstract

Coastal areas are particularly vulnerable to climate change due to their exposure to sea level rise and extreme weather events. However, estuarine ecosystems, such as mangroves, saltmarshes, seagrass meadows and reef forming organisms (oysters, corals), can significantly contribute to climate change adaptation efforts while offering additional benefits. These ecosystems act as natural buffers, mitigating water currents and adapting to rising sea levels through sediment accretion and soil elevation. Additionally, they support several complementary ecosystem services, including climate change mitigation through CO₂ sequestration, water purification and the support of recreational activities, among others.

The LIFE ADAPTA BLUES project aims to showcase the effectiveness of saltmarshes management as a Nature-Based Solution (NbS) for enhancing climate change adaptation along the European Atlantic coast. Through the combination of remote sensing, hydrodynamic modelling and field data on soil Corg stocks across saltmarshes from 8 European estuaries, we analysed the impact of historical estuarine restoration actions carried out in the Iberian Peninsula in the flooding risk derived from climate change and on the carbon sinks function in the restored areas.

We found that the coastal protection service was higher when restoration led to intertidal saltmarsh communities compared to subtidal species. On the other hand, the carbon storage within the restored areas increased as the area of high marsh communities increased in relation to other estuarine habitats.

Flexible Adaptation Strategies to Coastal Flooding Enhanced by Climate Change in Macaronesia Coastal Urban Areas: LIFE GARACHICO Project

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Abstract

Coastal areas are particularly vulnerable to climate change due to their exposure to mean sea-level rise and an intensification in the frequency and intensity of extreme events. Moreover, it is expected that these effects will be increased according to the latest climate change projections. Among the most vulnerable areas in Europe are the coastal urban areas of the Macaronesia Islands territories. In fact, there are several examples all along the Macaronesia islands where the effect of extreme weather events has already produced severe coastal flooding with dramatic effects, such as in the town of Garachico (north coast of the island of Tenerife, Spain), where the estimated annual economic losses in the last 10 years exceeded 1 million euros. Within the scope of sustainable development and, at the same time, with the aim of increasing resilience in these areas, the development of a new methodological framework for implementing risk reduction and adaptation measures in coastal flood-prone areas is proposed and implemented in Garachico, as a pilot case in Macaronesia. Adaptation measures are agreed with local communities through their contribution in public participation programs (interviews, meetings, ...) and awareness for a complete involvement of the different agents engaged in the management and use of urban coastal areas (local and regional). This new social approach will help to define the social risk perception and the acceptable levels of flood risk by means of surveys, interviews and interaction with the community, which are used as the reference for the adaptation measures design. Wave climate analysis covering historical events and future climate change scenarios are generated within the scope of a risk reduction analysis, based on the IPCC framework for the different adaptation measures designed for the municipality. Besides, results from social participation programs as well as its real application to the risk calculation and the adaptation measures definition will be presented.

Keywords: *Climate Change, Risk Assessment Flexible Adaptation, Coastal Flooding, Acceptable Risk, Social Perception*

Topic 3:

Communicating Climate Change Adaptation

Including, but not limited to:

- Strategies for raising awareness at all levels. From individuals to implementing agencies. From public to private entities.
- Knowledge transfer and scientific-based decision taking.
- Methods and strategies for participatory processes: stakeholder participation and engagement.

Modelling the Impact of Climate Change on Coastal Dwellings in Wales

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Abstract

Wales is located in the southwestern region of the UK and forms the westward extension of the island of Great Britain. The varied coastline of Wales is about 600 miles (970 km), and the most densely populated area is along the south, where both the larger urban centres of Swansea and the capital, Cardiff, are situated. Wales's climate is anticipated to be both warmer and wetter. 'Hot' summers are expected to become more commonplace by the middle of this century. Wetter weather, wind-driven rain and associated extreme storm events will also bring challenges. Flooding is becoming the new reality for many communities across Wales. Natural Resources Wales have warned that more than 36,000 dwellings are at risk of coastal flooding by the end of the century. However, in addition to flooding, there is a broader risk to building fabric and indoor environmental quality (IEQ) that must be understood. The aim of this research was to identify the impacts of climate change on Wales's coastal dwellings and the adaptations required to support dwelling owners and occupants in preparing for a changing climate. Two modelling approaches were applied, one to understand the impacts on IEQ and the other building fabric vulnerabilities. A climate vulnerability methodology was developed to predict future IEQ whilst a stressor-response methodology was applied to determine impacts on building fabric service life. Results show that there are significant summertime overheating risks in many properties, but importantly, all dwellings will experience increases in relative humidity, leading to poorer living conditions. Ventilation strategies to improve the extraction of moisture-laden air, must sit alongside flood adaptation strategies to prepare coastal communities for what lies ahead. Vitally, advocating regular maintenance and repair will not only reduce the risks associated with changing weather patterns but help motivate climate adaptive behaviours.

Keywords: *Adaptation, Behaviours, Building Fabric, Indoor Environmental Quality, Service Life, Ventilation*

Analysis of Homeowner Practices Triggering Housing Retrofits: A Practice Theory Approach

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Abstract

Poor energy performance in the housing sector is a critical problem to achieve climate change mitigation goals. However, energy retrofits do not show a satisfactory progress due to the poor interest of the homeowners, as they do not make the correct decision to retrofit their houses to achieve higher energy efficiency. Studies suggest that awareness itself does not lead to action.

The objective of the study is to identify and analyse the practices of homeowners that trigger housing retrofit decision-making. Accordingly, retrofit initiatives, policies and programmes can be tailor-made to suit triggering events of homeowner's practices.

A practice theory approach is used for the study to identify the practices of the homeowners in their contexts rather than focusing on the individual characteristics of the homeowners by way of multiple case studies. Fogg's behavioural model, Two Systems of thinking and other motivational theories will be used for this.

Tentative findings of the study indicate that triggering events for housing retrofit decision-making emerge during the day-to-day activities of the homeowners. By coupling motivation and ability with these triggers, decision-making can be encouraged, and retrofit progress will be caught up.

Retrofitting houses can be a personal choice as well as a social norm. Existing policies and measures to drive retrofit are mainly focused on the individual's characteristics. The study suggests a rather socially driven approach, aligned with the triggering points of homeowner's behaviour/practices will lead to greater decision-making to engage in housing retrofits.

Keywords: *Climate Change, Homeowner Decision-making, Housing Retrofit, Stakeholder Engagement*

The Adaptation to Climate Change Communication Experience in Navarre through LIFE-IP NAdapta-CC Project

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Abstract

The LIFE-IP NAdapta-CC project (LIFE16 IPC/ES/000001) is the first integrated European project for adaptation to climate change in the European Union for a region: Navarre. With fifty three actions, of which almost forty are of a technical nature, work is being carried out in various areas such as water, forests, agriculture, livestock, health, infrastructure and territorial planning, in addition to the monitoring portal and horizontal and transversal actions. Among the latter, a key transversal action is communication and networking. It is a fundamental part of the project to disseminate the progress of the actions, the value of the project and its technical activities, as well as to transfer the results and tools obtained.

The objective of the project, as well as of the Climate Change Roadmap for Navarre (HCCN-KLINA) of which it is a part, is to prepare citizens to tackle the effects of climate change. To carry out the purpose of a good project communication, it has been using different formulas. The dissemination of results through official press releases with their corresponding impacts on the media, the organization and/or participation in events as well as the preparation of training activities, and the continuous information through the official website together with interaction through social networks, are the fundamental communication lines to deal with climate change adaptation.

The results obtained so far are diverse after six of the eight years that the project has lasted. Nevertheless, it has been detected that depending on the type of approach, the response of the public or the direct agents involved may be higher if the subject directly affects them. Furthermore, it has also been perceived that giving close examples sharpen attendees' interest and allows them a better understanding of the issue and the possible measures to be implemented.

Communicating Climate Change Adaptation and Its Impact on Human and Planetary Health, from a Multidisciplinary, Inclusive, and International Perspective

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Abstract

Climate change is affecting the coastal environment, which increases the vulnerability of planetary and human health. This proposal explores the associations between climate change and health, on the one hand, and the experience of a transdisciplinary research programme in which the contribution of science communication and citizen science stands out, on the other. The impacts of climate change have significant ecological, social, and cultural implications that affect the basic living conditions (water, food, shelter-nexus/WFS-nexus) and heritage of some island's inhabitants. With the aim of contributing to equipping (Dutch) Caribbean societies with proficient tools for confronting these challenging climatic phenomena, three years ago the research programme "Island(er)s at the Helm" was proposed in The Netherlands and some Caribbean islands. This programme is planned for a total of five years and is organized into five interrelated work packages studying the WFS-nexus of the island(er)s. "Island(er)s at the Helm" adopts a transdisciplinary research design including: archaeology, paleoecology, (paleo)ethnobotany, social-cultural anthropology, visual arts, performance arts, political science, urban design, urban planning, governance and policy sciences, legal studies, architecture, and civil engineering.

This research programme brings together researchers and societal partners to combine technical, traditional, and contemporary knowledge practices to co-create sustainable and inclusive strategies for social adaptation to climate change. In parallel, the development of an international academic platform and a regional expertise center is also planned, to foster research-based education on climate challenges for the islands and the necessary policy advice. "Island(er)s at the Helm" researchers seek to create broader networks with those working on other related issues, such as public health. Climate change, the acceleration of urbanization, global warming, the intensification of intercontinental trade and travel, the co-evolution and adaptation between pathogens and mosquito vectors, and the development of insecticide resistance, have contributed to the spread of mosquito-borne diseases worldwide, which is a global public health problem. This proposal also describes links between climate variations and the emergence of climate-sensitive infectious diseases, such as some mosquito-borne diseases (Zika, chikungunya and dengue).

Empowering Multistakeholder Participation in Sustainable Coastal Management: Transdisciplinary Approaches on Climate Change Education and Awareness

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Abstract

Environmental management through multistakeholder participatory approach has remained one among many challenges for many coastal communities around the world. Despite many government and regulatory bodies promoting participatory approaches on environmental protection and climate change adaptation, cooperation among the private, public sector and local communities were not seen as effective in addressing current environmental issues and challenges. The opportunity to harness community empowerment in contributing, co-developing, and co-implementing environmental solutions is not optimized.

Reconciling development goals to competing interests of many stakeholders involved in environmental management would require innovative, compelling synergies and cooperation among many stakeholders. Governments, private sector, and local communities need to formulate effective and sustainable coastal management practices that are rooted to local culture, common yet differentiated interests of stakeholders, as well as transdisciplinary approaches in formulation and implementation of environmental management practices. Through a case study approach, this study aims to explore participatory approaches in environmental management of coastal communities by looking at case study examples in the Philippines. By identifying the key issues and challenges of multistakeholder involvement, this Study aims to unveil the potentials of developing guiding frameworks of participatory and transdisciplinary approaches on environmental management, especially on coastal communities. Integrating environmental management among communities guided by the principle of common pool resources, empowering multistakeholder approach would lead to a more effective uptake of climate change education and awareness across all disciplines and sectors.

This Study suggests that: coastal communities around the world would embrace a holistic and systematic approach on sustainable environmental management by (1) formulating and implementing environmental management practices rooted to local culture, and by (2) implementing delegated roles and responsibilities among stakeholders. Furthermore, establishing community-based management practices would also result in increased community relations and better promote climate change education and awareness, that would consequently improve community resilience and sustainability.

Key words: *Multistakeholder Participatory Approach in Environmental Management, Local Culture in Coastal Management, Transdisciplinary Approach on Climate Change Education and Awareness*

Topic 4:

Climate Change Education

Including, but not limited to:

- Lifelong learning in climate change adaptation in the built environment.
- Innovative and interdisciplinary practices in climate change education.
- Pedagogical styles and strategies for climate change education.
- Climate change education in the higher education curriculum.

Inclusive Disaster Education: Strategies and Challenges

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Abstract

The Sendai Framework for Disaster Risk Reduction (SFDRR) recognizes climate change as a vital disaster risk driver. SFDRR further endorses educational initiatives that advocate for reducing such disaster risks. The COVID-19 pandemic challenged the social order around the world including the education sector. The rise of the pandemic paved the way to significantly convert the education sector towards distant learning via digital platforms. This study is an investigation of the significant challenges associated with online distance learning in Disaster Risk Reduction (DRR) education. Hence, the objectives of the study were to consider the distance learning strategies used in DRR education and to identify their associated challenges. This abstract presents the findings of a study conducted as part of an output of the research collaboration co-funded by the EU Erasmus+ titled INCLUusive Disaster Education (INCLUDE). The data collection was two-fold where the learners' perspectives were investigated through an online survey and the educators' perspectives were investigated through expert interviews. The research was conducted in the country contexts of the research partners which include Lithuania, Japan, Sweden, and the UK. The findings suggest that Learning Management Systems, synchronous learning and flipped classrooms are the dominant learning strategies engaged by learners. However, the educators pointed out that they utilise various strategies such as games and role playing to enhance an organic and interactive environment during online sessions. The findings further suggest that challenges in online DRR education lie in inadequate ICT infrastructure and digital literacy, health related disturbances, professional and personal commitments leading to learning discontinuity, the digital divide, and vulnerable contexts such as poverty, disabilities, and living in disaster prone areas. Hence, the study concludes that in order to enhance the inclusivity of online DRR education, overall social and vulnerable contexts of the learners and the educators should be considered.

Key Words: *Disaster Education, Inclusivity, Learning Strategies, Online Distance Learning*

Transferring Scientific Knowledge about Coastal Ecosystems to Lifelong Learning Initiatives

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Abstract

The effective transmission of continuous advances in scientific knowledge is nowadays a basic task for research centers, which are faced with the need to participate in the process of specialized training beyond formal postgraduate teaching. The permanent high-level training of technicians and professionals is an activity increasingly demanded by society, as a response to the speed at which advances are made in certain scientific fields or the continuous introduction of new concepts. At the same time, the ongoing process of digitization of many training activities initiated during the pandemic has led to a paradigm shift both in the learning system and in the ways of recognizing the knowledge acquired.

Advances in scientific knowledge about estuarine and coastal systems are not an exception to these trends. Sustainability, Climate Change, Blue Growth, Nature based Solutions are obvious examples of the need to have systems of transmission and updating of contents that are adaptable through the lifelong learning process. These should be part of the specialized I+D+i projects themselves, within the transfer and dissemination of scientific knowledge.

This paper shows some examples of micro-credentials based on Masive, Open, Online Courses (MOOC), which were generated in specific projects related to the sustainability of coastal ecosystems (ERASMUS+TRASMARES project), or to the evaluation of the effects associated with climate change in estuarine (LIFE Adapta Blues project) or coastal ecosystems (C3N, C3N-PRO projects).

Keywords: *Training, MOOC, Postgraduate Learning*

Knowledge on Climate Change Adaptation and the Local Environment: Perspectives of Local Communities and Local Authorities

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Abstract

As Sir Francis Bacon in 1597 mentioned knowledge itself is power. When it comes to disaster risk reduction, knowledgeable local communities and local authorities will have the power of influence on decision makers regarding the specific actions that should be taken on making their communities resilient. Knowledge on local environmental process, their influence on disaster risk, and the changing patterns due to climate change needs to be extracted when assessing the disaster risk. Therefore, integrating community-based knowledge into disaster risk assessment should be one of the priority areas of focus when planning for disaster risk reduction. Within that scope this study aims at exploring the knowledge of local communities and local authorities on their local environment and its dynamic behaviour that can be adopted into disaster risk assessment. The study adopted a multiple embedded case study design with four cases in Sri Lanka based on two watersheds and two hazards of Landslides and floods. Both community-based interviews, expert interviews, focus group discussions were used as the methods of data collection followed by a thematic extraction and a classification. Results revealed that apart from few (less than 10% of the sample) there is a decay of knowledge on local environment among local communities that causes a lack of knowledge on dynamic behaviours of local environment due to climate change. In contrast to that local authorities have the learned general knowledge on environmental processes through research and other training programmes yet lack of community specific knowledge. Many experts highlighted that local communities are detaching from their local environment primarily due to commercialization and over dependant on technologies. Therefore, preservation of existing knowledge, encouraging environmental based learning, and creating of knowledge transfer platforms seems some of the key strategies to overcome the challenge of decaying of environmental based knowledge among local communities. The results concluded that despite of how significant the community-based knowledge on local environmental processes when understanding the disaster risk, it is equally important to focus on knowledge preservation and transition mechanisms to capture the micro environmental dynamics that enhances the disaster risk reduction within local communities.

Keywords: *Knowledge, Community-based Knowledge, Environment*

Towards the Inclusivity in Online Disaster Risk Reduction (DRR) Education

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Abstract

Digital power concentration and inequality raise questions regarding equal access to online education. In light of the close connection between vulnerabilities, disasters, resilience and education, inclusivity in DRR/climate change education is vital and this change starts within the classroom. Therefore, this study intends to investigate reconceptualising of online teaching strategies for inclusive online climate change/DRR education. This abstract presents the findings of expert interviews conducted for an output of the EU Erasmus+ co-funded research collaboration 'INCLUusive Disaster Education (INCLUDE)'. Interviews were conducted with 41 DRR educators across 4 countries including the United Kingdom, Japan, Sweden, and Lithuania. Experts were primarily asked to provide views on online DRR teaching strategies that encourage different learner perspectives and appreciate their differences. Interviewees as a whole value post-structuralism in education and promote inclusive discourses in their sessions/classrooms. Findings affirm the application of interactive means for their students from exposed, vulnerable, and disadvantaged communities, those who struggle with competing priorities, neurodiverse and disabled students, and even for students who are overwhelmed by face-to-face contact/ screens; including ensuring alternative communication/teaching means, promoting anonymity for better response, carefully deciding controlled conditions in assessing diverse student cohorts in disaster/climate change discipline, etc. They argued that online teaching strategies should be envisioned positioning the DRR learner not as a passive recipient of knowledge but as a mode to connect students, teachers, ideas, and experiences internationally with the intelligent use of interactive tools ranging from games, word-clouds, web-whiteboards, podcasts, Spotify challenges to advance tools like video neuro-analytics, web-and-text mining, multi-criterion intelligent decision support systems that compliment disruptive technologies. However, many changes required for inclusive teaching/learning necessitate improving material resources as well as educators' digital skills and competencies. Yet, the considerable influence lies with institutes than individual educators, especially in terms of facilitating the resources that inclusive education demands.

Key Words: *Disaster/Climate Change Education, Inclusivity, Online Education*

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