



Public Report on Capacity Building in Asia for Resilience EducaTion

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Further information

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Contents

1	Introduction	6
1.1	Partnership	7
1.2	Purpose of this report	7
2	Why do we need to build capacity for multi-hazard early warning?	8
2.1	Background	8
2.2	Global initiatives	11
2.2.1	Background to the post-2015 development agenda	11
2.2.2	Sendai Framework for Disaster Risk Reduction	12
2.2.3	2030 Agenda for Sustainable Development	13
2.2.4	Paris Agreement on Climate Change	14
2.2.5	Links to the urban development agenda	16
2.2.6	Convergence of disaster risk reduction, climate change and development	17
2.3	Planned outcomes and objectives of the project	18
2.3.1	Planned outcomes	19
2.3.2	Objectives of the capacity building	19
2.4	Enablers	19
2.5	Role of Higher Education Institutes	20
2.5.1	Capacity development	20
2.5.2	Education	21
2.5.3	Knowledge development	22
2.5.4	Advocacy	23
3	What are the capacity gaps in Asia?	26
3.1	Improve capacities for tsunami preparedness	26
3.1.1	Hazard and risk assessments	26
3.1.2	Policies, plans and guidelines	27
3.1.3	Detection, warning and dissemination	27
3.1.4	Public awareness, preparedness and response	27
3.1.5	Evacuation infrastructure	27
3.1.6	Tsunami exercises	27
3.1.7	Public awareness	27
3.2	Improve capacities for MHEW	27
3.3	Increase engagement of HEIs in capacity development for MHEW	28
3.3.1	Education	28
3.3.2	Knowledge development	28
3.3.3	Advocacy	28
4	What has CABARET achieved?	29
4.1	Activities of the project	29
4.2	Enhanced regional cooperation	30
4.3	Major achievements	31
4.3.1	Indonesia	31
4.3.2	Maldives	31
4.3.3	Myanmar	31



4.3.4	Philippines.....	31
4.3.5	Sri Lanka.....	31
4.3.6	Policy area and strategic priorities.....	32
4.3.7	Gender balance.....	32
4.3.8	Sustainable development.....	32
4.3.9	Involvement of people with fewer opportunities.....	32
4.3.10	Least developed countries and regions.....	33
4.3.11	Innovation.....	33
4.3.12	Curriculum development.....	34
4.4	Impacts.....	34
4.4.1	Impacts on staff and students.....	34
4.4.2	Impacts on institutional level.....	35
4.4.3	National or regional level.....	35
4.5	Dissemination.....	35
4.6	Sustainability.....	36
4.6.1	Multiplier effect of the project.....	37

List of figures

Figure 1: Target region, countries and Higher Education Institutes.....	6
Figure 2: Recent disaster impacts in Asia (source: EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium).....	8
Figure 3: Conceptual framework to describe how could HEIs contribute to achieve global initiatives through the development of effective MHEW.....	10
Figure 4: The role of higher education and capacity building for disaster resilience in coastal regions of Asia ..	25
Figure 5: Achievements of CABARET	29

1 Introduction

CABARET (Capacity Building in Asia for Resilience EducaTION) is a project co-funded by an EU Erasmus+ programme within the European Union that aims to strengthen research and innovation capacity for the development of societal resilience to disasters. CABARET is providing support to build capacity for international and regional cooperation between Higher Education Institutes (HEIs) in Asia (region 6) and Europe, and among Asian HEIs themselves, to improve MHEW and increase disaster resilience among coastal communities (Figure 1).

CABARET is addressing the cognitive and normative challenges in positioning early warning and preparedness in the wider trajectories of social change in societies and communities at risk. It is an imperative to take an integrated and holistic approach to early warnings for multiple hazards and risks tailored to user needs across sectors.

The new UN Sendai Framework for Disaster Risk Reduction, agreed by member states in 2015, includes a strong call for higher education to support the understanding of disaster risk and promote risk-informed decisions and risk sensitive planning from local to global levels. Researchers and academics, therefore, must work at the regional level, and with policy makers and practitioners to co-design and co-produce research that can be used effectively. Higher education must also play a vital role in translating that research into action through its educational programmes. Capacity should be developed through scientific research and development of knowledge bases as well as through education and training.

The project set out to identify research and innovative capacity needs across Asian HEIs in Indonesia, Maldives, Myanmar, Philippine and Sri Lanka, and to build capacity to broaden early warning to provide a comprehensive, multi-hazard framework.

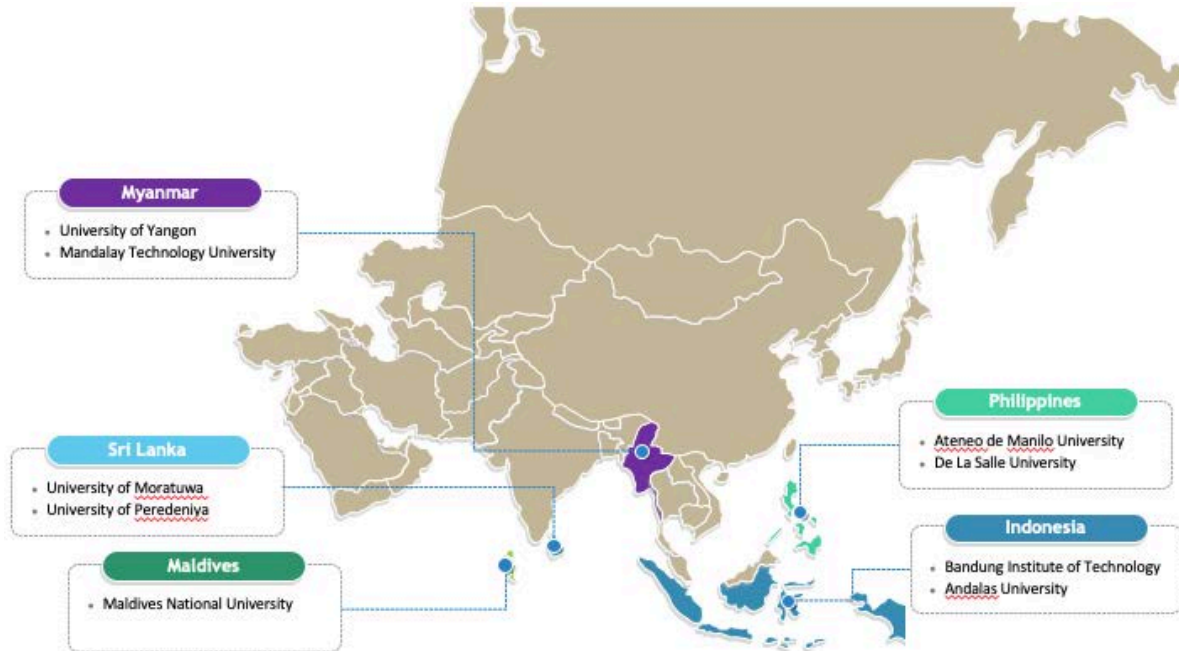


Figure 1: Target region, countries and Higher Education Institutes

1.1 Partnership

CABARET runs for three years, from October 2016 to January 2020. The project is led by the University of Huddersfield's Global Disaster Resilience Centre (GDRC), based in the United Kingdom. They are joined by a consortium of 15 European and Asian HIEs from Bulgaria, Indonesia, Latvia, Maldives, Malta, Myanmar, Philippines, Spain, Sri Lanka and the UK. Further the project works with 3 associate partners that represent major international, regional and national organisations.

European partners

University of Huddersfield United Kingdom (Lead Institution)
University of Central Lancashire United Kingdom
University of Cantabria Spain
University of Mining and Geology Bulgaria
University of Malta Malta
Riga Technical University Latvia

Asian partners

University of Moratuwa Sri Lanka
University of Peradeniya Sri Lanka
Bandung Technical Institute Indonesia
Andalas University Indonesia
Maldives National University Maldives
De La Salle University Philippines
Ateneo de Manila University Philippines
Mandalay Technological University Myanmar
University of Yangon Myanmar

Associate partners

IOC-UNESCO
Asian Disaster Preparedness Center
Federation of Sri Lankan Local Government Authorities

1.2 Purpose of this report

This report summarises the background to the project, as well as the key results and outcomes to emerge during its implementation.

2 Why do we need to build capacity for multi-hazard early warning?

2.1 Background

The five CABARET partner countries in Asia include communities that are highly exposed and vulnerable to the threat posed by multiple coastal hazards, as illustrated in Figure 2. Myanmar is exposed to a number of natural hazards, some of which have caused devastating damage in the recent past. According to the UN Risk Model, Myanmar ranks as the ‘most at risk’ country for natural disasters. With its long-awaited political changes and a civil society in need of access to funding, capacity building and technical training, there is an urgent need to develop capacity for disaster preparedness and climate change adaptation in Myanmar. Indonesia is located at one of the most active geological subduction zones in the world and has growing coastal populations. Future tsunamis are likely to occur due to increased tectonic tensions leading to abrupt vertical sea floor alterations. Sri Lanka was one of the countries most affected by the 2004 tsunami and coastal erosion has been accelerated due to upstream anthropogenic activities and poorly planned coastal infrastructure development. 80% of the land area of Maldives is less than one meter above sea level and the Maldives identified as one of the most vulnerable countries globally to climate change and sea level rise. As a tropical archipelagic nation, the Philippines is particularly susceptible to coastal hazards, which are being exacerbated by climate change. The 2014 World Risk Report identifies the Philippines as the 3rd most hazard exposed country in the world, and the 2nd most at risk.

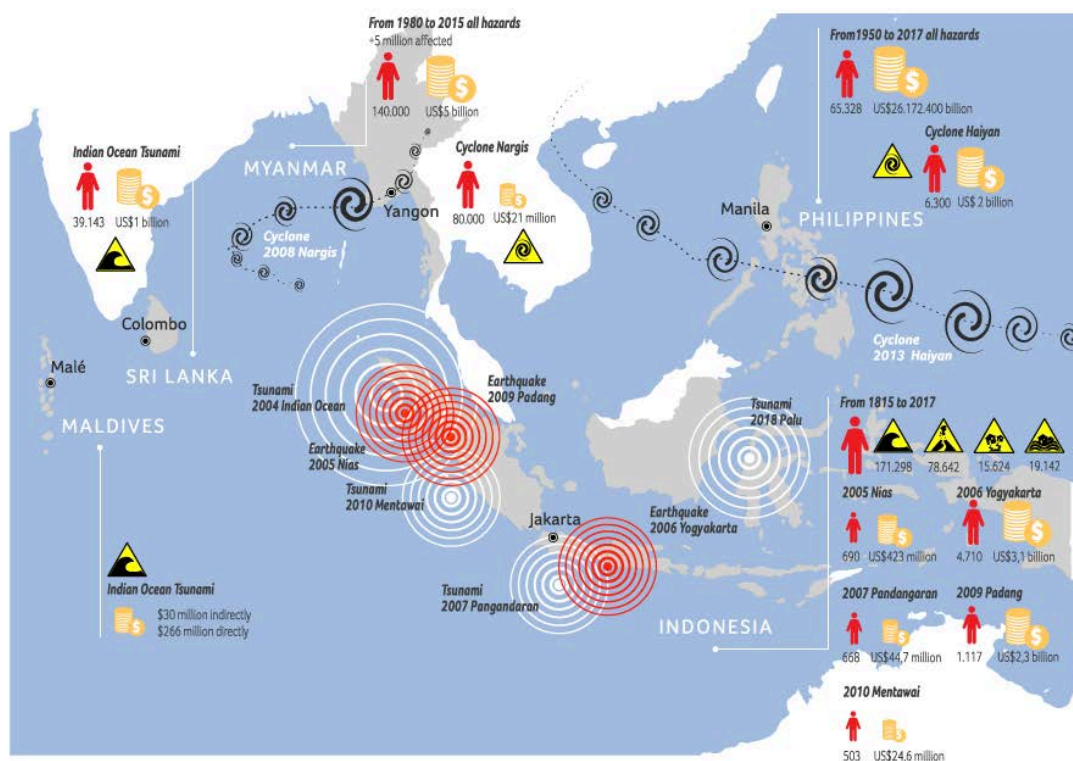


Figure 2: Recent disaster impacts in Asia (source: EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium)

The Indian Ocean Tsunami on 26th December 2004 resulted in the loss of over 230,000 lives including over 2,500 foreign tourists, and the displacement of over 1.6 million people around the Indian Ocean, with economic losses of about \$14 billion. A 2015 United Nations (UN) report estimates that each year, an additional 60,000 people and \$4 billion (US\$) in assets are exposed to the threat of tsunami hazard. As demonstrated by the human and economic losses from the 2004 Indian Ocean and 2011 Tōhoku disasters, and most recently, in Palu and Saluwesi, Indonesia, tsunamis inflict death and damage through violent, powerful flooding along the world's coastline. The shortcomings in preparation have been due to a lack of warning through poor regional detection and communication systems, but they also reflect inadequate awareness, planning and coordination.

Tsunamis can be broadly classified as local, as in Palu, where coastal residents feel an earthquake and have only minutes before the tsunami begins flooding, or distant, where coastal residents do not feel the earthquake and have an hour or more before tsunami flooding commences. In both types, an effective end-to-end early warning system is fundamental to mitigate losses. The decision on whether to evacuate an area is central to this system, but also fraught with difficulties. Failure to evacuate in a timely manner can leave tens of thousands of people exposed to a tsunami wave. Unnecessary evacuation and false alarms are also costly, as demonstrated by the Alaskan Earthquake in 1986, which is estimated to have cost Hawaii \$40M. A false alarm is also liable to reduce confidence in the reliability of any warnings that are issued and increase complacency among communities, thereby hindering preparedness for future tsunami threats.

In 2004, no tsunami warning system existed for the Indian Ocean. Following the disaster, the Intergovernmental Oceanographic Commission (IOC) of UNESCO was given the mandate to develop and implement an Indian Ocean Tsunami Warning and Mitigation System (IOTWMS)¹. An Intergovernmental Coordination Group (ICG) for the IOTWMS was established by the IOC Assembly in July 2005 (Resolution IOC-XXIII-12). Member States of the ICG/IOTWMS include 28 countries: Australia, Bangladesh, British Indian, Ocean Territory, Comoros, Djibouti, France, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Myanmar, Oman, Pakistan, Seychelles, Singapore, Somalia, South Africa, Sri Lanka, Tanzania, Thailand, Timor-Leste, United Arab Emirates, and Yemen. 22 of these are DAC countries, with ten of them categorised as least developed. After 8 years of international collaboration and development, facilitated and coordinated by IOC UNESCO, the IOTWMS became fully operational on 31st March 2013 with Regional Tsunami Service Providers (RTSPs) established by Australia, India and Indonesia.

An end-to-end tsunami warning system begins with the upstream rapid detection of a tsunami wave, including detection, verification, threat evaluation, and forecasting. It ends with a well prepared community that is capable of responding appropriately to a warning, including delivery of public safety messages, risk assessment and management, initiating national counter-measures, and preparing and implementing standardised reactions.

Recent studies and practical experiences from the Indian Ocean region suggest that more attention needs to be paid to the cognitive and normative challenges in positioning the tsunami early warning systems and preparedness in the wider context of social change in the coastal societies and communities at risk, and for critical reflection of 'on-the-ground' experiences and lessons learnt. Although the ICG of IOTWMS has been largely successful in promoting regional cooperation to develop the technical hazard detection infrastructure, progress at the national and sub-national level has been far more variable. A review of national reports, recent earthquake and tsunami threat responses, and practice evacuation exercises suggests uneven progress across the region, with some high-risk, low-capacity countries falling behind.

¹ UNESCO-ICO; UN/ISDR/PPEW; WMO. (2005). Assessment of Capacity Building Requirements for an Effective and Durable Tsunami Warning and Mitigation System in the Indian Ocean: Consolidated Report for 16 Countries Affected by the 26 December 2004 Tsunami

This situation, together with the increasing globalisation of risk, calls for strengthened multi-hazard early warning (MHEW) systems at all levels. It also calls for an integrated and holistic approach to early warnings for multiple hazards and risks tailored to user needs across sectors. In this regard, international and regional collaboration as well as multi-stakeholder partnership at all levels is critically necessary, given the transboundary nature of most coastal hazards.

These are all key to the successful implementation of the global plan to reduce disaster losses, the Sendai Framework for Disaster Risk Reduction 2015-2030², whereby countries and partners highlighted the need to: Continue to invest in, develop, maintain and strengthen people-centred, end-to-end early warning systems; Promote the application of simple and low cost early warning equipment and facilities; Broaden the dissemination channels for early warning information to facilitate early action. Countries also called for the further development of and investment in effective, nationally compatible, regional multi-hazard early warning mechanisms. To address these needs, global Target (g) of the Sendai Framework was adopted, namely to “substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030”. Further, evidences show that MHEW could be more effective when it is integrated within regional and national strategies for enhancing resilience and reducing disaster risks.

There remains the significant challenge of building capacity to sustain the achievements to date and continue to enhance the systems now in place, including detection and warning systems, community awareness and preparedness. There is also a need to build capacity to broaden early warning to provide a comprehensive, multi-hazard framework.

Figure 3 illustrates the conceptual framework that underpins the CABARET project. Findings from literature review and opinions of partners and stakeholders through a consultative process, provided the basis for developing the final conceptual framework³.

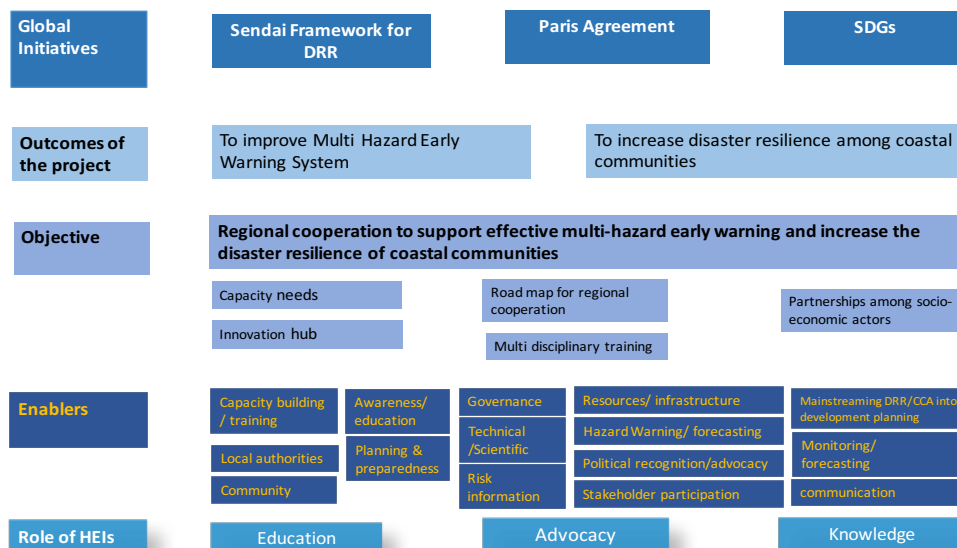


Figure 3: Conceptual framework to describe how could HEIs contribute to achieve global initiatives through the development of effective MHEW

² UNISDR. (2015). Sendai Framework for Disaster Risk Reduction 2015 - 2030. Retrieved from Geneva Switzerland: http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf

³ Haigh, R., Amartunga, D., & Hemachandra, K. (2018). A capacity analysis framework for multi-hazard early warning in coastal communities. *Procedia Engineering*, 212, 1139-1146

2.2 Global initiatives

Global, national and local efforts to reduce disaster risks and climate change risks have co-existed in recent years but there has been rising attention to the relationship between climate change adaptation and disaster risk reduction. There are substantial similarities in the types of interventions needed to reduce both kinds of risks and there is considerable opportunity for mutual learning.

Climate-related disasters have also become a rallying point in the international climate negotiations – a tangible, immediate reason to push for more ambitious climate action. The relationship between climate change and disaster risk – and between strategies to address them – have become a very timely and policy-relevant issue.

2.2.1 Background to the post-2015 development agenda

When they were introduced, the Millennium Development Goals (MDGs) were the most widely supported and focused poverty reduction targets established on a global scale. Eight goals were signed up to by 191 nations in 2000. They included 18 targets and 48 indicators for progress.

When the world community signed up to the Millennium Development Goals (MDGs) in 2000, disaster risk reduction was not included in strategies of their attainment. Although the Millennium Declaration did recognise that disasters can jeopardise development and included a commitment ‘to intensify our collective efforts to reduce the number and effects of natural and man-made disasters’ in the General Assembly Resolution, disaster risk was not subsequently taken into account in formulation of the goals and indicators.

In January 2005 and following the devastation caused by the 2004 Indian Ocean Tsunami, at the World Conference on Disaster Reduction, in Kobe, Japan, 168 Governments adopted a 10-year plan to make the world safer from disasters. The Hyogo Framework for Action, had as its key goal the substantial reduction of disaster losses by 2015 in lives and the social, economic and environmental assets of communities and countries.

The Framework offered guiding principles, priorities for action and practical means for achieving disaster resilience for vulnerable communities. It became increasingly clear that disasters are one of the key factors holding back progress towards halving poverty and the other MDGs. As donor governments and the international community increasingly focused their work through the prism of attainment of the MDGs there was a need to pull together the various attempts which have been made to integrate disaster risk reduction into a common set of assessment guidelines which can be used by national governments.

Various reviews of the HFA were carried out during its implementation. They found that progress in DRR was occurring, especially institutionally in the passing of national legislation, establishing of early warning systems, and strengthening disaster preparedness and response. However, they also raised concerns about:

1. the lack of systematic multi-hazards risk assessments and early warning systems factoring in social and economic vulnerabilities
2. the poor integration of DRR into sustainable development policies and planning at national and international levels
3. the insufficient level of implementation of the HFA at the local level.

Specifically, the reviews tended to highlight the need to integrate climate change adaptation and DRR at the national and local levels through integrated plans to enhance resilience of communities. They also recognised that guidance alone is not sufficient and that standards to ensure quality in the delivery of the guidance are necessary.

The final review recommended the development of a joint action plan to help generate and crystallise such coherence. On a post-2015 framework for DRR, the review examined the pros and cons of a legally-binding agreement, and how it would work.

2.2.2 Sendai Framework for Disaster Risk Reduction

The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognises that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. It aims for the following outcome:

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

The Sendai Framework is the successor instrument to the HFA. It is the outcome of stakeholder consultations initiated in March 2012 and inter-governmental negotiations held from July 2014 to March 2015.

The Framework included seven global targets:

- a) Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015.
- b) Substantially reduce the number of affected people globally by 2030, aiming to lower average global figure per 100,000 in the decade 2020 -2030 compared to the period 2005-2015.
- c) Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
- d) Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
- e) Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
- f) Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030.
- g) Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

It also included four priorities for action:

Priority 1. Understanding disaster risk

Priority 2. Strengthening disaster risk governance to manage disaster risk

Priority 3. Investing in disaster risk reduction for resilience

Priority 4. Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

The Sendai Framework has some significant differences to its predecessor agreement. The Sendai Framework focuses on disaster risks while the HFA focuses on disaster losses. In addition, the Sendai Framework focus more on “the how” while the HFA focus more on “the what”. It also adds man-made hazards, as well as biological hazards and increases the scope of action in recovery, rehabilitation and reconstruction, as compared to the HFA.

2.2.3 2030 Agenda for Sustainable Development

The Transforming Our World: The 2030 Agenda for Sustainable Development outcome document recognises and reaffirms the importance of reducing the risk of disasters in the future. There are three types of links or recognition of disaster risk reduction in the outcome document. The first are direct references to the outcomes of the Third UN World Conference on Disaster Risk Reduction and the Sendai Framework for Disaster Risk Reduction 2015-2030. The second are where reducing the risk of disasters will be highly relevant and critical to the achievement of the goal or target, for example in reducing exposure and vulnerability of the poor to disasters or building resilient infrastructure. The third are goals and targets that are highly conducive to a disaster risk reduction approach.

The Transforming Our World: The 2030 Agenda for Sustainable Development outcome document can be viewed through the lens of disaster risk reduction. These include the following direct and highly relevant references to disaster risk reduction:

The outcome document highlights the drivers of disaster risk including gaps in governance, urbanisation, the impact of poor management of natural resources and ecosystems, as well as poverty and the implications of climate change. In paragraph 14 of the outcome document, the challenge “more frequent and intense natural disasters” present to sustainable development is clearly underscored. The Transforming Our World agenda further outlines the underlying principles and the major policy shifts required to support the implementation of the SDGs, specifically calling for application of technology that is climate-sensitive and resilient, safe and resilient human habitats, and the promotion of resilience and disaster risk reduction.

There are multiple targets on disaster risk reduction and resilience in the Transforming Our World: The 2030 Agenda for Sustainable Development outcome document. These focus on poverty eradication; strengthening resilience of sectors such as agriculture, education, and infrastructure; reducing mortality and economic losses from disasters; and enhanced planning around resilience and adaptation.

- SDG 1 calls for an end to poverty in all its forms everywhere and recognizes that reducing exposure and vulnerability of the poor to disasters is essential for sustainable poverty eradication (target 1.5).
- SDG 4 on quality education promotes safe learning environments (target 4.a) which echoes the Sendai Framework call for resilience and safety of schools to be strengthened in structural and non-structural ways.
- SDG 9 focuses on building resilient infrastructure with target 9.1 specifically asks to develop quality, reliable, sustainable and resilient infrastructure. Target 9.a aligns one of the targets of the Sendai Framework on the substantial reduction of disaster damage to, and strengthening of, critical infrastructure.
- SDG 11 on inclusive, safe, resilient and sustainable cities and human settlements has explicit links are seen with the Sendai Framework targets. Target 11.5 calls for reducing the “number of deaths” and “direct economic losses relative to global GDP” caused by disasters, which align directly with the global targets (a), (b) and (c) of the Sendai Framework. Target 11.b calls for an increase in the number of cities and human habitats with integrated plans on inclusion, resource efficiency, adaptation to climate change and resilience to disasters “in line with the Sendai Framework for Disaster Risk Reduction 2015-2030”, calling for aligned implementation on the ground. Other targets under this goal promote enhanced urban planning and upgrading of slums, which also tackle key risk drivers for disaster losses.
- SDG 13 is on combating climate change and where all the targets can be linked to the Sendai Framework, for example target 13.1 which calls for strengthening resilience and adaptive capacity to disasters.
- Finally, SDG 15 aims to protect, restore and promote sustainable use of terrestrial ecosystems. The goal reinforces the need to protect the ecosystem services which includes vital hazard regulating services. The goal specifically calls for efforts to combat desertification and restore land affected by drought and floods. This is closely aligned with the goals and ecosystem-related priorities of the Sendai Framework and reinforces the linkages with related international decisions on ecosystems and disaster risk.

Other targets in the Transforming our World, including those on health and water management, also relate to disaster risk reduction by virtue of promoting the principle of early warning and addressing disaster risk drivers, and aiming to reduce vulnerability and/or exposure of people and planet to hazards.

Despite these clear alignments to DRR, the SDGs have been criticised for being inconsistent, difficult to quantify, implement and monitor. Some analysis suggests that there exists a potential inconsistency in the SDGs, particularly between the socio-economic development and the environmental sustainability goals. Critiques also raise questions on the measurability and monitoring of the broadly framed SDGs. The goals are non-binding, with each country being expected to create their own national or regional plans. Moreover, the source(s) and the extent of the financial resources and investments for the SDGs are ambiguous.

2.2.4 Paris Agreement on Climate Change

The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC), dealing with greenhouse-gas-emissions mitigation, adaptation, and finance, signed in 2016. The agreement's language was negotiated by representatives of 196 state parties at the 21st Conference of the Parties of the UNFCCC in Le Bourget, near Paris, France, and adopted by consensus on 12 December 2015. As of November 2019, 195 UNFCCC members have signed the agreement, and 187 have become party to it.

The Paris Agreement addresses crucial areas necessary to combat climate change. Some of the key aspects of the Agreement are set out below:

Long-term temperature goal (Art. 2) – The Paris Agreement, in seeking to strengthen the global response to climate change, reaffirms the goal of limiting global temperature increase to well below 2 degrees Celsius, while pursuing efforts to limit the increase to 1.5 degrees.

Global peaking and 'climate neutrality' (Art. 4) – To achieve this temperature goal, Parties aim to reach global peaking of greenhouse gas emissions (GHGs) as soon as possible, recognising peaking will take longer for developing country Parties, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHGs in the second half of the century.

Mitigation (Art. 4) – The Paris Agreement establishes binding commitments by all Parties to prepare, communicate and maintain a nationally determined contribution (NDC) and to pursue domestic measures to achieve them. It also prescribes that Parties shall communicate their NDCs every 5 years and provide information necessary for clarity and transparency.

Voluntary cooperation/Market- and non-market-based approaches (Art. 6) – The Paris Agreement recognises the possibility of voluntary cooperation among Parties to allow for higher ambition and sets out principles – including environmental integrity, transparency and robust accounting – for any cooperation that involves internationally transferal of mitigation outcomes. It establishes a mechanism to contribute to the mitigation of GHG emissions and support sustainable development, and defines a framework for non-market approaches to sustainable development.

Adaptation (Art. 7) – The Paris Agreement establishes a global goal on adaptation – of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change in the context of the temperature goal of the Agreement. It aims to significantly strengthen national adaptation efforts, including through support and international cooperation. It recognizes that adaptation is a global challenge faced by all. All Parties should engage in adaptation, including by formulating and implementing National Adaptation Plans, and should submit and periodically update an adaptation communication describing their priorities, needs, plans and actions. The adaptation efforts of developing countries should be recognized

Loss and damage (Art. 8) – The Paris Agreement recognises the importance of averting, minimising and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage. Parties are to enhance understanding, action and support, including through the Warsaw International Mechanism, on a cooperative and facilitative basis with respect to loss and damage associated with the adverse effects of climate change.

Finance, technology and capacity-building support (Art. 9, 10 and 11) – The Paris Agreement reaffirms the obligations of developed countries to support the efforts of developing country Parties to build clean, climate-resilient futures, while for the first time encouraging voluntary contributions by other Parties. Provision of resources should also aim to achieve a balance between adaptation and mitigation.

Climate change education, training, public awareness, public participation and public access to information (Art 12) is also to be enhanced under the Agreement.

Transparency (Art. 13), implementation and compliance (Art. 15) – The Paris Agreement relies on a robust transparency and accounting system to provide clarity on action and support by Parties, with flexibility for their differing capabilities of Parties.

Global Stocktake (Art. 14) – A “global stocktake”, to take place in 2023 and every 5 years thereafter, will assess collective progress toward achieving the purpose of the Agreement in a comprehensive and facilitative manner. It will be based on the best available science and its long-term global goal. Its outcome will inform Parties in updating and enhancing their actions and support and enhancing international cooperation on climate action.

Mitigation of climate change by cutting emissions could be seen as the ultimate form of disaster risk reduction as it prevents the creation of new risk while also trying to reduce the stock of existing levels of risk. However, in a world that has already warmed by over 1°C on average, where sea-levels are rising and Arctic Sea ice and glaciers are disappearing, adapting to the impacts of climate change to reduce disaster risk will be essential regardless of efforts to cut emissions.

The interlocking nature of all risk drivers is evident in the Sendai Framework for Disaster Risk Reduction. It calls for more dedicated action to tackle underlying disaster risk drivers, including climate change and variability.

Likewise, the Paris Agreement has specific mention of the Sendai Framework in the preamble of the agreement, and the focus in Articles 7 and 8 on strengthening resilience and reducing vulnerability to climate change in language that resonates with the goals of the Sendai Framework to reduce both risk and disaster losses.

Specifically, the Sendai Framework seeks a substantial increase in the number of countries with national and local disaster risk reduction strategies by 2020. This links closely with the tasks set out in Article 7 of the Paris Agreement, particularly the formulation of “nationally determined prioritised actions, taking into account vulnerable people, places and ecosystems”.

The Sendai Framework also calls for a substantial increase in the availability of, and access to, multi-hazard early warning systems and disaster risk information by 2030, an activity mentioned in Article 8 of the Paris Agreement which also references the resilience of communities, livelihoods and ecosystems.

Despite these efforts and the Paris Agreement in 2015, there have been significant challenges during implementation. 195 out of 197 parties originally approved the Agreement. Syria didn’t sign because it was at war and therefore unable to attend the negotiations. Nicaragua was the only party in attendance that didn’t sign as it deemed it a weak and unfair deal.

158 parties went on to ratify the deal and commit to its goals. Members include the UK, EU, China and India. The US ratified it but in 2019 initiated the process of leaving the Paris climate agreement, citing that it would undermine the US economy.

Other critics have highlighted that it is a voluntary agreement and countries must take necessary efforts – but there is no obligation to keep global warming below 1.5°C, or even 2°C. Many developing countries also require significant financial and technological support to cut their emissions, but there is limited support being provided by developed economies.

The COP25 summit in Madrid, held in November 2019, highlighted further problems. The UN Environment Programme's (UNEP) own emissions gap report, released just prior to the COP, showed the stretch 1.5C goal of the Paris Agreement was “slipping out of reach”. Even if existing climate pledges – countries' Nationally Determined Contributions, or NDCs – are met, emissions in 2030 will be 38% higher than required to meet that target, the report concluded. The talks were also unable to reach consensus in many areas, pushing decisions into 2020 under “Rule 16” of the UN climate process. Matters including Article 6, reporting requirements for transparency and “common timeframes” for climate pledges were all pushed back into 2020, when countries are also due to raise the ambition of their efforts.

2.2.5 Links to the urban development agenda

The New Urban Agenda is a 20-year global blueprint adopted by United Nations Conference on Housing and Sustainable Urban Development or Habitat III, which closed in Quito, Ecuador, in October 2016. Among other components, it called for exploring and developing feasible solutions for climate and disaster risks in cities and human settlements. It was preceded by the establishment of the first urban SDG, known as SDG11. SDG11's definition is to ‘make cities inclusive, safe, resilient and sustainable’.

In 2017, 54% of the world's population lived in urban areas and that proportion is expected to increase to 66% by 2050. There is now a consensus about the importance, perhaps even the centrality, of urban processes to securing sustainable futures in a range of fields including climate change, economic growth, poverty eradication, public health and food security. The assertion of a “new urban agenda” in global policy reflects a long campaign to locate cities at the centre of development debates.

Urbanisation has been a normal part of growth and expedites economic development. but it also brings challenges that need examination and treatment. Some of the crucial challenges include insufficient urban services, ageing infrastructure, informal settlements, poverty, increasing inequality, resource scarcity, social insecurity and environmental degradation.

The New Urban Agenda envisions an urban paradigm shift in which cities and human settlements must be for everyone. This means equal rights, the right to adequate housing and fundamental freedoms, along with functional social and civic systems, with participatory access. Gender equality, accessible urban mobility for all, disaster management and resilience, and sustainable consumption are envisaged.

Leaders committed to:

- Provide basic services for all citizens
- Ensure that all citizens have access to equal opportunities and face no discrimination
- Promote measures that support cleaner cities
- Strengthen resilience in cities to reduce the risk and the impact of disasters
- Take action to address climate change by reducing their greenhouse gas emissions
- Fully respect the rights of refugees, migrants and internally displaced persons regardless of their migration status
- Improve connectivity and support innovative and green initiatives
- Promote safe, accessible and green public spaces

When developing the agenda, it was anticipated that for implementation, it would require new urban rules and regulations, improved urban planning and design, and municipal finance, among other things. Long-term, integrated urban planning and design, and sustainable financing frameworks and the cooperation of all levels of government, with the participation of civil society and stakeholders, are some of the key components of the New Urban Agenda.

The New Urban Agenda has multiple connections beyond itself and contributes directly to achieving the targets set out in the Sustainable Development Goals, Paris agreement, Sendai Framework for Disaster Risk Reduction, Addis Ababa Action Agenda and several other international frameworks and agreements.

The New Urban Agenda has been receiving positive investment and funds, such as the Green Climate Fund, the Global Environment Facility and the Adaptation Fund, which are facilitating investments in urban development projects. Large financial institutions like the African Development Bank, the Asian Development Bank (ADB), the Inter-American Development Bank and the World Bank have shown keen interest and support for developing financial frameworks for investments in cities.

Though multiple cases suggest evidence of decent progress, there are still implementation challenges that have limited the uniform adoption of the New Urban Agenda. Studies have reported:

- A lack of measurable indicators
- Inadequate national and local capabilities
- Weak institutional frameworks, decision-making, and regulations
- Insufficient local ownership, authority and decision-making power
- Limited private sector engagement

These findings suggest that further work is needed, especially in building internal and external capabilities, institutional frameworks, collaborations and defining uniform data collection processes and methods.

2.2.6 Convergence of disaster risk reduction, climate change and development

In responding to the Sendai Framework and other post-2015 development agreements, including their calls for enhanced multi-hazard early warning, this paper describes the results of the first stage of a longer-term study into the capacity of MHEW across Asia. The first phase of the study involved the development of a regional capacity analysis framework for MHEW. The framework covers a range of dimensions, such as legislative, planning, infrastructure, technical and scientific, and institutional partnerships. The framework was developed through the processes of consultation and needs assessments by the project partners and relevant socio-economic actors.

Development faces a growing threat from a changing climate – particularly through the impact of more extreme events. The Organisation for Economic Co-operation and Development (OECD) estimates show that up to 50% of development assistance may be at risk because of climate change. In managing such risks to development, there is significant overlap between disaster risk reduction (DRR) and climate change adaptation (adaptation). However, these agendas have tended to evolve independently.

DRR can deal with current climate variability and be the first line defence against climate change, being therefore an essential part of adaptation. Conversely, for DRR to be successful, it needs to take account of the shifting risks associated with climate change and ensure that measures do not increase vulnerability to climate change in the medium to long-term.

Many previous studies have revealed limited integration of DRR and adaptation despite the two agendas sharing similar goals and conceptual overlaps, and both struggling to be mainstreamed into regular development planning. At stake is policy coherence and effective use of resources, as studies show that continued separation results in administrative inefficiencies, duplication of efforts and damaging competition between different inter-sectoral coordination mechanisms.

For both adaptation and DRR, effective development planning and programming are essential. Managing risks and uncertainties for all shocks and stresses supports sustainable development, particularly in the face of mounting evidence that disasters are hampering development and poverty alleviation.

On the other hand, as experience has shown, neither adaptation nor DRR will happen naturally. There is often little political will or financial incentive to invest resources to ensure that something does not happen, rather than investing in visible infrastructure or social programs. The incentives are even more skewed given that the donor community provides generous humanitarian assistance after a disaster but largely fails to provide similar support for risk reduction. Attention to incentives, institutions and instruments to promote good risk-aware development is urgently needed.

However, both agendas suffer from a lack of political influence and human capacity to raise the profile of risk management in mainstream development planning and practice. In developing countries, adaptation and DRR typically have separate institutional “homes”, often ministries of environment for adaptation and ministries of the interior or similar agencies for DRR, each with their own intersectoral coordination groups, each with their own channels of funding, and each with separate entry points in the different international agreements described in earlier sections of this unit.

While sharing very similar objectives, and similar challenges in raising the profile of their agendas, they typically fail to coordinate among themselves. Such duplication of efforts, administrative inefficiencies, and even competition among various groups not only hampers DRR and adaptation efforts but compromises the overall effective use of resources.

At a more technical level, the growing climate change efforts may waste time and impact reinventing the wheel if they neglect existing experience, methods and tools developed for DRR. On the other hand, efforts on DRR that do not take account of changing hazards may not only fail to achieve their objectives, but even increase vulnerability, for instance when flood defences provide a false sense of security but will fail to provide lasting protection against rising flood risk.

2.3 Planned outcomes and objectives of the project

Building more resilient coastal communities is increasingly complex, demanding an ever-widening range of skills and input from diverse disciplines. Often, no single individual, institution or discipline will possess all the knowledge, skills and techniques required. This is a strategic partnership, sharing the mission to play a leading role in shaping preparedness and early warning systems to develop increased resilience among coastal communities.

Disasters hold back development and progress towards the Sustainable Development Goals and have macroeconomic impacts when the infrastructure, productive capital and stocks are damaged, creating long term effects on livelihoods and putting the poorest into poverty. The shortcomings in preparation have been due to a lack of warning through poor regional detection and communication systems, but they also reflect inadequate awareness, planning and coordination.

The CABARET project directly addresses some of the challenges set out by the United Nations Economic and Social Commission for Asia and the Pacific, which stresses the importance of a regional approach. Progress in MHEW is uneven across the Asian region, with some high-risk, low-capacity countries falling behind. There is also uneven progress by hazard type and subregion. CABARET focuses on regional MHEW systems as an effective means of addressing many of the gaps identified above, in particular in sharing scientific knowledge and applications, building capacity, and addressing transboundary disasters.

It addresses the cognitive and normative challenges in positioning early warning and preparedness in the wider trajectories of social change in societies and communities at risk.

It is an imperative to take an integrated and holistic approach to early warnings for multiple hazards and risks tailored to user needs across sectors. In this regard, international and regional collaboration as well as multi-stakeholder partnership at all levels is critically necessary, given the transboundary nature of most natural hazards. CABARET is innovative through contributing to the development of a prominent “voice” for early warning at the international level that could raise the visibility and advance the agenda of MHEW regionally worldwide and advocate the usefulness of MHEW in international platforms and among key stakeholders, including donors, and across all sectors. It will develop regional innovation infrastructure to promote scientific cooperation and knowledge transfer.

2.3.1 Planned outcomes

CABARET aimed to promote international cooperation at the regional level, between Higher Education Institutes (HEIs) in Asia (region 6) and Europe, and among Asian HEIs themselves, to improve multi-hazard early warning and increase resilience among coastal communities. It set out to build capacity, foster regional integration and cooperation through joint initiatives, sharing of good practices and cooperation among HEIs in Asia and Europe. CABARET strengthened relations between HEIs and the wider economic and social environment through its focus on coastal communities, many of which are under severe pressure resulting from planned and unplanned development, population growth and human induced vulnerability, coastal hazards with increasing frequency and magnitude, and the impacts of global climate change.

CABARET sought to enhance regional and transboundary cooperation for MHEW, and empower individuals and organisations with the skills, competencies and credentials needed to promote and sustain regional cooperation within Asia and Europe, and within Asia itself, aimed at reducing the likelihood and impact of disasters in coastal communities. It enhanced the capacities of the partner HEIs in Asia to meet (match) the challenges and specific needs of the wider economic and social environment - strengthening the internationalisation of HEIs and their capacity to network effectively in research, scientific and technological innovation, facilitate the exchange of experience and practice despite of diversity, and increase the ability of partner HEIs in Asia to build relationships with relevant socio-economic actors. It also provided a set of multi-disciplinary training courses tailored for rapid skill (knowledge, qualifications,) acquisition for professional teams involved in multi-hazard early warning.

2.3.2 Objectives of the capacity building

CABARET achieved this by: 1) identifying intra and inter regional cooperation capacity needs across partner country HEIs for the development of more effective MHEW; 2) creating an innovation hub for resilient coastal communities, promoting scientific cooperation and knowledge transfer in Higher Education within Asia, and between Asia and Europe on MHEW; 3) developing a capacity building roadmap to address regional gaps and priorities; 4) exploring, promoting and initiating opportunities for fruitful university partnerships with socio-economic actors in coastal communities; 5) developing innovative multi-disciplinary training courses tailored for rapid skill (knowledge, qualifications,) acquisition for professional teams involved in multi-hazard early warning at the national and regional level.

2.4 Enablers

In supporting the achievement of the project outcomes, the project team carried out a literature review to better understand the enablers to develop capacity for multi-hazard early warning that can increase disaster resilience for coastal communities. The literature review was based on 16 peer reviewed journal articles, 16 official reports and 10 official websites. This is complemented with partners’ views through consultative process with 16 Asian experts representing Indonesia, Maldives, Myanmar, Philippines and Sri Lanka and 9 European experts representing Bulgaria, Latvia, Malta, Spain and the UK.

Based on the literature review⁴ and the consultative process with the partners and stakeholders, 15 enablers were identified: capacity building/ training, governance, communication, local authorities, education and awareness, planning and preparedness, technical and scientific, resources and infrastructure, hazard warning and forecasting, political recognition, stakeholder participation, mainstreaming DRR/CCA into development planning, and hazard monitoring.

2.5 Role of Higher Education Institutes

The role of Higher Education in supporting capacity building for disaster resilience has been explored in previous projects led by members of the CABARET project team, including ANDROID⁵ and CADRE⁶, and which informed the key elements of this conceptual framework: education, knowledge development, and advocacy. The ANDROID disaster resilience network was established in 2011 (Academic Network for Disaster Resilience to Optimise Educational Development). The network was set up to promote co-operation and innovation among European Higher Education and in doing so, to increase society's resilience to disasters of human and natural origin. An underlying tenet of ANDROID was that higher education should be more innovative, providing opportunities to work in close collaboration with industry, communities, humanitarian agencies, private sectors and other higher education institutions. Several partners in CABARET were members of the ANDROID network.

2.5.1 Capacity development

The concept of capacity building or capacity development appeared in the late 1980s and became deeply entrenched within the development agenda in the 1990s. Rather than representing a new idea, it reflected growing criticism of many development assistance programmes. In contrast to this extraneous approach, it emphasised the need to build development on indigenous resources, ownership and leadership and by bringing human resources development to the fore.

The concept of capacity development was therefore a move away from 'aid' or 'assistance' towards a 'help yourself' approach that was designed to prevent a dependency on aid emerging.

Capacity development is based on learning and acquisition of skills and resources among individuals and organisations. While this process may rely on some imported resources, external capacity is seen as a knowledge-sharing device, which allows the strengthening and developing of the local capacity. As such, it relates closely to some definitions of resilience, which stress the objective is to build resilience by maximising the capacity to adapt to complex situations, and whereby resilience describes an active process of self-righting, learned resourcefulness and growth.

Capacity development is committed to sustainable development, to a long rather than short term perspective, and attempts to overcome the shortcomings of traditional donor- led projects that have been prevalent in many pre- and post-disaster projects and — typically criticised for being too short-term rather than sustainable, and not always addressing the needs of the recipients. Development within a capacity building context allows communities and countries to identify their own needs, and design and implement the best resilience building strategy within the local context. As a process, it builds on monitoring and evaluation in order to identify existing capacities, deficiencies and the progress and achievements of development towards resilience.

⁴ Haigh, R., Amartunga, D., & Hemachandra, K. (2018). A capacity analysis framework for multi-hazard early warning in coastal communities. *Procedia Engineering*, 212, 1139-1146

⁵ Amaratunga, D., Faber, M., Haigh, R., Indirli, M., Kaklauskas, A., Lill, I., Perdikou, S., Rochas, C., Sparf, J., Perera, S., Thayaparan, M., and Velazquez, J. (2015) ANDROID Report: Disaster Resilience Education and Research Roadmap for Europe 2030. Disaster Resilience Network)

⁶ Amaratunga, D., Haigh, R., Malalgoda, C. and Keraminiyage, K. (eds.) (2017) Mainstreaming disaster resilience in the construction process: Professional education for a resilient built environment. A report of the CADRE project: Collaborative Action towards Disaster Resilience Education)

According to capacity development principles ownership of disaster risk reduction and reconstruction projects is transferred from the donor to the recipient community. For this reason, capacity development is not necessarily linked to development aid but can also describe a community or country's effort to meet their resilience building goals regardless of external assistance.

2.5.2 Education

At the individual level, capacity building refers to the acquisition of skills, through formal education or other forms of learning. Although skills and knowledge can be acquired in various settings, formal education systems play a paramount role in this connection.

At the organisational level, capacity building focuses on infrastructure and institution building, the availability of resources and the efficiency of processes and management to achieve effective and quality results within existing infrastructures. In education, this level signifies the improvement of domestic educational resources and a better use of those already available. institutions, e.g. universities, through additional

At the sector/network level, capacity building seeks to enhance the consistency of sector policies and promote a better co-ordination between organisations. In education, capacity building could for example aim at improving links between vocational and academic educational institutions, between research-intensive and teaching-only institutions or to improve the co-ordination of institutions across different academic fields.

In general, the higher education sector plays a significant role in any capacity development strategy. The ultimate goal of a capacity development strategy is to achieve progress and development. Higher education has a unique privilege as a built-in feature of any capacity development strategy. Whatever the sector, including those engaged with disaster risk reduction and reconstruction, capacity building relies on the strengthening of individual capacity through training and learning, in order to raise the domestic or regional stock of human capital in a specific field. This can be done by setting up specific educational programmes in the formal education system or by other forms of learning. Although some of the necessary skills would typically be acquired on-the-job or through learning-by-doing, countries characterised by less efficient organisations of work or by obsolete technologies might need to rely more on formal vocational education and training. What level of education (primary, secondary or tertiary) is required to achieve this goal depends on the kind of competence to be built? Post-secondary education, including degree-granting tertiary education, is certainly important for developing capacity in building resilience to disasters due to the complexity of the associated challenges.

The ANDROID project identified some key changes in education that are required. There is an expanding field of disaster management, but simultaneously, a lack of young professionals with appropriate skills and knowledge to support the building of resilience within relevant stakeholders. There is a need to maintain and expand the network of key persons, including change agents and facilitators.

ANDROID's survey on education supply and demand found that despite considerable need for programmes to support the building of resilience, there is currently a lack of programmes that meet employer needs. It also found that the availability of programmes differed greatly across Europe, and that most programmes are recent developments, with very few having been in operation for over 5 years. This emphasises the immaturity of the discipline and the needs for further studies to better understand market needs.

Higher education within Europe must develop flexible and customised programmes and curricular, whether a module in regular Masters or Undergraduate curriculum, or as dedicated postgraduate programmes. Detailed market research is required to understand the need and interest in potential students, with clear linkages to future job markets. This will help to ensure that educational programme address the problems from the field and can promote affordable solutions, as per local context, including the cultural calibration of technology. Educational programmes should promote a multi-disciplinary approach and understanding, drawing upon a combination of different faculty.

The problem-based nature of the field determines that programmes should offer an appropriate balance of theory and field experiences. Internship programmes for students in government, NGOs, UN agencies, private sectors, research institutions should be strongly promoted.

At the same time, the pace of scientific discoveries demands that programmes are research linked to ensure that what is being taught by higher education is consistent with the state of the art. Improving the link between research, education and action will require the transfer of research knowledge into teaching but also recognising that the research and teaching link as a two-way knowledge transfer process. In a 'knowledge society' all graduates have to be researchers. Not only are they engaged in production of knowledge; they must also be educated to cope with risks and uncertainties generated by the advance of science.

Higher education programmes and research training must also develop the skills to shift perspectives easily, and continually see things in new ways. Researchers and students must be comfortable with multiple languages and a variety of ontologies, epistemologies, methods, tools, and theoretical perspectives, and shift easily among them.

2.5.3 Knowledge development

The Sendai Framework for Disaster Risk Reduction 2015-2030 aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health, and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the next 15 years.

It has been recognised that the success of this post-2015 framework hinges on creating and implementing policies that are built on the best available knowledge.

Higher education has a vital role in supporting this move to a more disaster resilient society by 2030. The previously published ANDROID project roadmap considered the challenges and opportunities that must be addressed by higher education in Europe if it to effectively support Sendai Framework for Disaster Risk Reduction 2015-2030.

The prime focus must be that the policy-science gap is closed with research that can be translated to action. Research studies document a trend of increasing disaster losses, but the translation of research findings into practical actions has proven difficult and remains a barrier that prevents the best use of science.

There remains a recognised need for higher education, through researchers and educators, to provide and communicate actionable knowledge with explicit links to inform effective, evidence-based decision-making.

ANDROID established that future knowledge development will require new approaches and partnerships. Higher education will need to develop multi-actor and multi-sector alliances to tackle the type of emerging priorities in areas such as understanding disaster risk, governance arrangements, investment decisions, preparedness, and rehabilitation and reconstruction.

These alliances will support the development of problem-based education and research programmes, and thereby help to create and implement evidence based, resilience building policies and practices.

An all-hazard, problem-focused approach should be used in resilience building research and education to address the complexity of disaster risk. This will require collaboration and communication across the scientific disciplines. Higher education can promote this approach by providing researchers and students with:

- Exposure to a variety of disciplinary work
- Exposure to interdisciplinary work
- Exposure to and experience with tools and methods from a variety of disciplines
- Exposure to and experience with interdisciplinary tools and methods
- Experience working with others in an interdisciplinary mode

Funders, publishers and editors must not reinforce disciplinary silos, and should promote and encourage the development and publication of multi- and interdisciplinary research. The scope of scientific panels and peer-reviewed journals should reflect the importance of problem-focused research, rather than be defined by traditional academic disciplines.

Review panels, editorial boards and scientific committees should reflect the diverse array of disciplines required to address major societal challenges such as building disaster resilience.

Researchers and educators must interact and collaborate with policy-makers and practice based actors at the local, national, regional and global levels. Collectively they must work to identify and address problems and knowledge gaps from the field. Rather than being passive recipients of new knowledge, policy makers and practitioners should join with higher education to form multi-stakeholder groups that work together from the outset to design and deliver new knowledge. The scientific results will be more relevant and actionable.

Higher education must also recognise the importance of public engagement before, during and after research, in particular with institutions and individuals at risk of disasters. This can serve a number of often overlapping purposes:

- Informing: inspiring, informing and educating the public and making the work of higher education in building resilience more accessible.
- Consulting: actively listening to the public's concerns and insights - institutions and individuals at risk of
- disasters should be invited to participate in research (surveys, vulnerability assessments and other activities) to collect local knowledge.
- Collaborating: working in partnership with communities and the public to solve problems together, drawing on each other's expertise.
- Localisation: a lot of disaster knowledge has been developed at an abstract level, or based on a specific
- context. Public engagement can help calibrate knowledge to a local context, extending the impact and reach of existing research.

2.5.4 Advocacy

As well as creating new knowledge, higher education has a vital role to play in capacity development and in doing so, providing a means by which effective knowledge transfer can take place.

Greater priority should be put on sharing and disseminating scientific information. The research community must make more effort to translate traditional outputs into practical methods that can readily be integrated into policies, regulations and implementation plans towards building resilience.

National research assessment exercises, the European Union and national funding bodies, and higher education promotion policies, which often emphasise traditional academic outputs (e.g., peer reviewed journal articles), should appropriately incentivise and reward non-standard scientific outputs, such as research summaries and policy briefs.

The recent shift towards open access of research outputs and education is to be welcomed and should continue to be encouraged. The high levels of disaster risk found in low-income countries make it an imperative that European research and education is made widely available. The European Union and other research funding bodies should require all funded scientific outputs to be made available as open access. This includes the use of green publishing routes where possible, or financially supporting gold publishing as necessary.

Higher education should be supported to develop open educational resources that are freely accessible and openly licensed, for use in teaching, learning, and assessing as well as for research purposes linked to building resilience.

Educators and the research community must take time and effort to understand the audience they are seeking to inform. Scientific results are often subject to misunderstanding due to poor comprehension of numbers and statistics, as well as conflicting languages and terminology.

Correct comprehension depends not only on the skills and knowledge of the reader, but also on the way the information is presented. By assuming a weaker background knowledge (e.g. of scientific language) and low “statistical literacy”, evidence summaries can add information to help readers better understand the strengths and limitations of the scientific evidence being summarised. Adding meta-information that explains concepts such as the quality of the evidence may help eliminate frustration and trigger reflection.

The volume of research activity and associated outputs has rapidly increased over recent decades. While expanding the knowledgebase may be considered positive in one sense, it has made the field increasingly difficult to navigate, whether it be for experienced researchers and educators, early career researchers and students, or other stakeholders, including policy makers. Identifying and accessing the most recent and high quality science is proving increasingly challenging despite the advance of technology.

Methods and tools for aggregating knowledge must be developed to facilitate access to science, technology and innovation outputs that help inform policymaking and practice, and also ensure that educational programmes and researchers have access to and can build upon the state of the art.

Science provides an evidence base that can be relevant to and therefore draw together different areas of policy. Knowledge integration provides a starting point for building and operationalizing resilience through the co-design of policies and interventions by scientists, practitioners, policy makers and communities themselves. Standardised definitions are essential to the operationalization of concepts such as resilience for research, monitoring and implementation purposes. For example, in epidemiology, case ascertainment/ definition is essential to accurately understanding the causal relationship between a disease exposure and its outcome.

Common understanding amongst all actors is essential for effective disaster risk reduction and management. Approaching towards 2015, the Joint Research Centre of the European Commission has been contributing to identifying the most common terms and definitions used in disaster risk reduction. This background information would provide a solid basis to continue updating the terminology and contribute to the implementation of the post-2015 framework on disaster risk reduction.

The role of higher education, as well as some of the barriers and enablers, are illustrated in Figure 4.

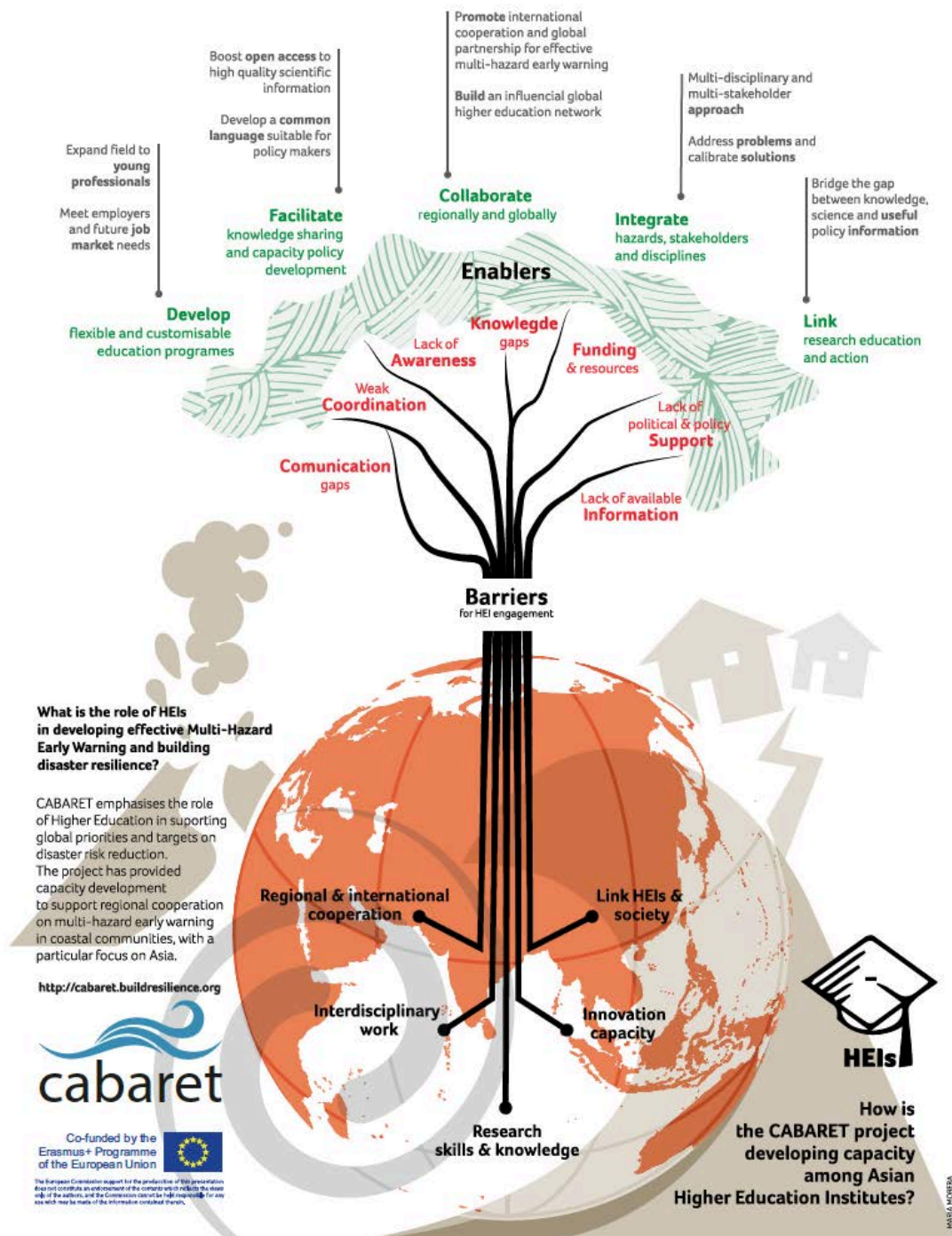


Figure 4: The role of higher education and capacity building for disaster resilience in coastal regions of Asia

3 What are the capacity gaps in Asia?

The project developed a regional position paper⁷ to provide an understanding about the overall disaster status in Asia, the availability of early warning systems for tsunami and multi-hazard, the present status of regional cooperation, and enablers and barriers for an effective MHEW in Asia. In addition, the report considers the role of Higher Education Institutions (HEIs), and their present status in developing effective MHEW in Asia.

The findings and recommendations of this report were based upon:

- A conceptual framework developed from a literature review and outcomes of workshops conducted with partners and key stakeholders.
- The results of the ICG/IOTWMS and its “Task Team on Capacity Assessment of Tsunami Preparedness” (TT-CATP), which includes a survey of 20 countries in the Indian Ocean. The CABARET project supported the development and analysis of this regional survey.
- A regional literature review and expert survey.
- Five national position papers from five CABARET partner countries – Indonesia, Maldives, Myanmar, Philippines and Sri Lanka

This regional position paper was an attempt to engage users and beneficiaries, which increases the likelihood that the project can achieve a positive impact. This allowed different audiences to have their input during the preparation and development phases, and not simply receive the results at the end. The specific problems to be addressed by CABARET are strategically important: Progress in MHEW is uneven across the Asian region, with some high-risk, low-capacity countries falling behind. Greater participation in regional MHEW will lower the cost, strengthen the sustainability and thus enhance the value for all members, as a single country would normally not be able to implement such a complex system without the cooperation of other countries and relevant regional and international organisations. Through improved regional cooperative mechanisms on MHEW, countries will be better able to share good practices, expertise and capacities in assessing risks, developing sustainable monitoring and warning services, creating proper dissemination and communication systems, and coordinating with communities to increase response capabilities. Higher Education, as a key actor in developing capacity and developing scientific knowledge, has an important role in improving this type of regional cooperation. Some of the key recommendations established through this paper include the following:

3.1 Improve capacities for tsunami preparedness

3.1.1 Hazard and risk assessments

1. Increase engagement of other national, regional or international actors in the carrying out of tsunami hazard and risk assessments
2. Increase the availability of publicly accessible data for tsunami hazard and risk assessments
3. Increase the capacity for tsunami hazard assessment, especially in the areas of evacuation mapping, hazard mapping and inundation mapping
4. Capitalise on the existing capacity in Member States for delivering training on hazard mapping and inundation mapping
5. Increase the capacity for city, village and community level tsunami risk assessments
6. Increase the capacity for developing products from tsunami risk assessments, such as risk maps, evacuation maps, guidelines and action plans

⁷ Haigh, R., Amaratunga, D., and Hemachandra, K., (eds) (2019) Multi-hazard early warning to increase disaster resilience in coastal regions: a regional position paper. CABARET project



3.1.2 Policies, plans and guidelines

7. Provide support to increase availability of tsunami policies, plans and guidelines at the prevention and mitigation, preparedness, and recovery and reconstruction phases of disaster management
8. Provide support to increase availability of tsunami policies, plans and guidelines at the local level, either as standalone or as part of a multi-hazard approach

3.1.3 Detection, warning and dissemination

9. Provide support to increase the capacity for analysing real-time seismic and sea level data for tsunami threat
10. Provide support to increase the capacity for tsunami modelling to support generation of threat forecasts
11. Undertake a further study to examine whether there is a need for so many different software tools to be used to analyse data for tsunami threat or tsunami modelling
12. Increase the frequency of tabletop or similar tsunami warning exercises to review and test SOPs, and reduce the potential for complacency among countries that have not experienced a recent tsunami event

3.1.4 Public awareness, preparedness and response

13. Provide support for countries to improve their SOPs at the interface between upstream and downstream, including the operation of a 24/7 emergency operation centre, receiving information from the NTWC, and response criteria and decision making, as well as the associated human resources and infrastructure
14. Provide support for countries to improve their SOPs to address warning dissemination, communication with the NTWC, communication with other stakeholders, evacuation call procedures, communication with local government and media arrangements, as well as the associated human resources and infrastructure
15. Provide support for the development of community level evacuation SOPs
16. Capitalise on the willingness of countries to share their SOPs to share good practices across Member States

3.1.5 Evacuation infrastructure

17. Provide training and share Member States' experience of different types of evacuation infrastructure

3.1.6 Tsunami exercises

18. Provide support to incorporate tsunami level exercises into cities, villages, communities and schools

3.1.7 Public awareness

19. Provide training and share Member States' experience of different public engagement materials
20. Develop educational materials such as teaching kits, and encourage the incorporation of tsunami awareness into the school curricular
21. Raise awareness of the Global Disaster Risk Reduction Day and Tsunami Awareness Day

3.2 Improve capacities for MHEW

22. Significant efforts must be made to assure the adequacy of existing EW and communication of EW to reach "last mile" in the region.
23. Continuously evaluate and monitor the current status of existing early warning systems
24. Develop mechanisms for regional cooperation, including greater knowledge sharing and networking
25. Mainstream early warning into development planning
26. Increase disaster education and awareness raising
27. Develop inclusive and context specific disaster preparedness plans
28. Develop supportive policy and institutional frameworks

29. Develop technological systems for real time monitoring and forecasting
30. Increase multi-stakeholder partnerships, collaboration and networking

3.3 Increase engagement of HEIs in capacity development for MHEW

3.3.1 Education

31. HEIs should engage in capacity building among community through education, awareness and training
32. Develop more curriculum that address disaster risk reduction and resilience
33. Understand the needs to employers, including public authorities, NGOs and the private sector, to ensure that programmes for disaster risk reduction meet sector needs
34. Encourage students to conduct research in the area of disaster management, resilience and MHEW to facilitate evidence-based policy making
35. Incentives can be offered to encourage faculty to support capacity-building of stakeholders
36. Encourage the natural curiosity of students towards sciences in the midst of cultural expectations

3.3.2 Knowledge development

37. HEIs should be a place for training and technician incubators on disaster management in Asia
38. Build collaborations between HEIs and governments in conducting applied research
39. Deloading schemes are needed to allow faculty more time for research
40. Encourage relevant research with long term societal impact, fostering reflexive research attitude in young researchers
41. Provide an institutional environment that support trans disciplinary contextual research
42. Formulate and conduct research that integrates aspects such as long-term sustainability and resilience of communities as key focuses

3.3.3 Advocacy

43. Establish communication mechanisms between governments and HEIs to deliver outcome of evidence-based research
44. Create inter-ministerial cooperation
45. Give opportunities to more engage in local processes, as well as in international bodies and technical working groups
46. Academic staff should be trained to work with government organisations that have the specific mandates in the fields of MHEW and disaster resilience
47. Continuous dialogue is required among agencies to encourage better coordination, encouraging and supporting researchers to work with other stakeholders
48. HEIs should not be limited to evidence-based policy making but also need to create industry – HEI linkages for mutual benefits
49. Inter-HEI exchange (national and international) can be used as a way of increasing the role of HEIs in resilience education

4 What has CABARET achieved?



Figure 5: Achievements of CABARET

4.1 Activities of the project

Activities were implemented within eight work packages, each with specific activities and deliverables:

WP1: Capacity dimensions for MHEW and coastal resilience were developed based on a synthesis of literature and focus groups discussions with partners. The model had 15 dimensions, was aligned to global frameworks on sustainable development, climate change and disaster risk, and examined the role of Higher Education in developing capacity, including education, advocacy and knowledge development. This model was published and provided the basis for five national level analyses of capacity for MHEW and coastal resilience, as well as a regional position paper on the same.

WP2: General administration and management of the project, including convening six steering committee meetings, holding a kick off meeting in Sri Lanka, developing a consortium agreement and terms of reference, and publishing six e-newsletters.

WP3: Convened a quality board which met six times and who developed a quality plan, commissioned three independent evaluation reports coordinated partner and participant evaluation surveys and annual self evaluations, and conducted period reviews of capacity building progress.

WP4: Established a regional innovation hub that promoted innovative, multi/inter-disciplinary and international working among HEIs to address regional challenges on MHEW and coastal resilience. This resulted in six sandpit groups emerging that addressed challenges on small island states, MHEW, education for disaster resilience, public private partnerships for resilient harbour projects, evacuation planning for marginalised groups, and risk assessment at the local level. These groups organised 14 capacity building activities and 1 mentoring programme and facilitated 7 EU-Asia and Asia-Asia exchanges involving 35 people.

WP5: Developed a capacity building roadmap to address regional gaps and priorities based on six capacity building activities, development of a framework for research & innovation in disaster management, and delivered international and regional cooperation training for 231 across four events.

WP6: Prepared a university – social and economic partnerships strategy and secondment plan for partner institutions based on a World Cafe Activity, conducted a secondment with Batangas in the Philippines and delivered university-social and economic partnership training events for 231 people in four training events.

WP7: Develop functional and technical specification of the Online capacity building platform. Adapted an existing ASCENT project online capacity building platform for hosting materials, developed a module handbook template, and developed 4 courses covering Disaster Preparedness, Introduction to Coastal Disasters, Science and Technology for Disaster Risk Reduction, and Community Based Disaster Risk Management.

WP8: Developed a dissemination plan, developed a project website and promotional kit, developed a sustainability plan to set out the means by which the cooperation can continue after the project (activity 8.3), hosted seven policy dialogues, including with regional actors on tsunami early warning through IOC-UNESCO IOTWMS Working Group 1 and prepared two policy briefs, for Myanmar and Sri Lanka.

4.2 Enhanced regional cooperation

The CABARET project involved fifteen institutions from ten different countries. The consortium included six institutions from five European countries (Bulgaria, Latvia, Malta, Spain, the UK) and nine institutions from five Asian countries (Indonesia, Maldives, Myanmar, Philippines and Sri Lanka). On the regional level, new linkages were made through engagement with regional efforts on tsunami early warning, including collaboration with IOC-UNESCO. Work packages were co-led by one institution from Europe and one from Asia in order to ensure inter-regional working. A secondment programme conducted as part of WP6 and enabled Asian partners to visit European institutions and other Asian partners to develop cooperative relationships. From the point of view of contributions towards regional integration and cooperation between different regions of the world, CABARET had provided a very strong platform. A series of sandpit events allowed consortium members to develop new project proposal ideas together around six regional priorities, and combining international partners and multi-disciplinary teams.

Over ten new collaborative project proposals in related areas have been developed and submitted among the CABARET partnership, including the following:

- CANDID(CooperAtioN on Disaster Induced Displacement): An EU- Asia International network for scientific cooperation and knowledge transfer for disaster induced displacements. Proposal submitted. Led by HUD.
- SECRA: Strengthening University-Enterprise Collaboration for Resilient Communities in Asia. Proposal submitted. Partners include UoP, DLSU, MTU, UoY, MNU and HUD.
- Displacements due to Disasters. Led by HUD, partnered with UoM and UoP.
- Mitigating hydro meteorological hazard impacts, EC Erasmus+ ICM, €91,770, HUD, ITB, AU.

Grants awarded including joint collaborations among CABARET partners:

- 2020-2023 BRITAE: Building Resilience in Tropical Agro-Ecosystems. Proposal submitted. Partners include UoM, HUD
- 2020-2021 Newton Prize Indonesia - Harmonising tsunami early warning at the local level, £200,000, Newton Fund. HUD and ITB.
- 2018-2021 [Indonesia] Mitigating hydro meteorological hazard impacts through transboundary river management in the Ciliwong River basin, NERC / ESRC / RISKTEKDIKTI, £ 466,655.66. ITB, UoH and University of Swansea

- 2018-2021 Additional funding for NE/S003282/1: [Indonesia] Mitigating hydro meteorological hazard impacts through transboundary river management in the Ciliwong River basin, NERC/ESRC/Ristekditi, UK value: £93,072 (FEC) / £74,457 (grant) ITB and UoH
- 2017-2019 Mainstreaming Integrated Disaster Risk Reduction and Climate Change Adaption Strategies into Coastal Urban Agglomeration Policy, UK Newton Fund, £116,820 Grant agreement 261824838.
- 2017-2020 Governance of the upstream-downstream interface in end-to-end tsunami early warning systems, Funder: UK GCRF, £110,000, HUD, UoM, ITB, MNU, UoY.

Representatives from the Maldives, Myanmar and Sri Lanka HEIs, who had not previously engaged with the regional tsunami early warning system, worked with Indonesia and the University of Huddersfield to undertake a series of national studies looking at the interface arrangements for tsunami early warning in each country and provided the basis for comparative analysis. These findings were reported to IOC UNESCO ICG/IOTWMS “Working Group 1 Tsunami Risk, Community Awareness and Preparedness, the international group responsible for coordinating the Indian Ocean Tsunami Warning and Mitigation System. All partners also reviewed and provided input on the Capacity Survey of Tsunami Preparedness, which is coordinated by IOC UNESCO at the regional level among 28 members states.

4.3 Major achievements

4.3.1 Indonesia

- Identification of gaps in the country's interface arrangements for tsunami early warning
- ITB and BMKG forged new regional links with HEIs in partners in other parts of the region, and coordinated a survey of tsunami preparedness in conjunction with IOC-UNESCO IOTWMS
- Hosted a major international conference on disaster risk reduction, with over 150 participants from across the region and world, and national and regional stakeholders in disaster management

4.3.2 Maldives

- Development of multi-institution and international OERs that are to be used in the country's first Bachelor level disaster management programme
- Development of small island state research and collaboration agenda, in collaboration with Maltese partners
- Development of new linkages between HEIs and the Maldivian Ministry of Environment and Energy

4.3.3 Myanmar

- HEIs developed new links with the country's Department of Meteorology and Myanmar Disaster Preparedness Agency, and who are now collaborating on joint early warning research
- MTU participated in their first EU-Asia regional collaborative project, gained research management experience by co-leading a WP, and forged new links with other Asian HEIs
- Development of research agenda on flood risk assessment with coastal communities

4.3.4 Philippines

- Hosted a mentor programme for early career researchers, that drew upon international expertise from the EU and across Asia.
- Conducted a secondment activity with the city of Lian Batangas, including with the Mayor, members and officers from the Lian Batangas and than 100 participants
- Development of a regional special interest group on disaster resilience education

4.3.5 Sri Lanka

- Development of new linkages between the Sri Lankan HEIs and the country's national Disaster Management Centre, who are now collaborating on joint research projects

- Developed strong researcher links between engineering and social science disciplines across UoM and UoP, including on the issue of evacuation and marginalised groups
- Development of a sustainable international platform promoting international collaborative initiatives and are now seeking to lead a proposal in Horizon Europe

4.3.6 Policy area and strategic priorities

To ensure that the project supported regional and national priorities, a detailed capacity assessment was conducted that involved the five programme countries. The assessment was based on a capacity framework with 15 critical areas that supports implementation of the global agreements on sustainable development, climate change and disaster risk reduction, and linked to the role of HEIs in education, advocacy and knowledge development. The framework was jointly developed by the consortium based on HEI priorities in each country. Specific policy briefs were developed for each country.

4.3.7 Gender balance

Traditionally, disaster resilience research within HEIs has been under-represented by women including that of all CABARET Asian partner institutions, a situation that is changing very slowly. Given the poor participation levels for women in within disaster resilience research, CABARET recognised the need to improve their capacities in them taking up relevant research and accordingly, the involvement of women was actively encouraged throughout the project. Efforts have been taken to address this even at the project proposal level. Many of the WP leaders were women, including Liyanage / Rahayu (WP1), Shadiya (WP7), This fostered an initial positive culture within CABARET. Where recruitment was undertaken (e.g. for CABARET training events) the CABARET consortium pursued recruitment policies which did not discriminate on the grounds of gender, marital status, family status or age. These followed best practice guidelines in place at the coordinators host University. All positions within the project were open to all applicants regardless of gender.

4.3.8 Sustainable development

R&I capacities in disaster resilience research were enhanced through the CABARET training programme, allowing high quality multi-hazard early warning and coastal resilience research to be produced. This paves the way for disaster resilience to be built, which in itself is a key aspect of sustainable development. The project also enhanced the capacities of academics in Asian countries to carry out multi-hazard early warning and coastal resilience research domestically, reducing reliance on externally produced research, which contributes to the production of knowledge in a sustainable way. A Sustainability Plan (WP8) was developed as part of the project. This plan outlined how the projects work will be continued past the funding period.

4.3.9 Involvement of people with fewer opportunities

In CABARET partner countries, including Indonesia, Maldives, Myanmar, Philippines and Sri Lanka, women are under-represented in many aspects of society, and many suffer from limited access to opportunities compared to men. CABARET actively encouraged the involvement of women in training events through its open recruitment process. Several women from partner institutions had the opportunity to co-lead work packages and to deliver training events (see also Transversal Issues). Equal opportunities were given for people with fewer opportunities in taking part in all CABARET activities. Several activities that were carried out as part of CABARET had direct reference to social aspects of people with fewer opportunities, such as focused special interest groups (WP4) that promoted joint working and sharing of practice on evaluation planning for specific groups, such as disabled people and the elderly, who have specific needs and requirements for evacuation in an emergency and who are often marginalised or suffer higher death rates during a disaster.

4.3.10 Least developed countries and regions

Myanmar, one of the partner countries participating in ASCENT, is classified by the UN as a Least Developed Country. Two institutions in Myanmar were involved in CABARET, the University of Yangon and Mandalay Technical University, the latter for whom it was their first European project and previously to CABARET they did not have a PIC number. Mandalay Technical University were co-work package leaders with an EU programme institution on WP3. This provided them with an opportunity to upgrade their project management skills. The University of Yangon hosted the fourth steering committee meeting and second training workshop in October 2018, while Mandalay Technical University hosted a workshop in conjunction with three EU partners in the same visit. The two institutions took part in assessing capacity needs at institutional and national level for WP1 and staff and students participated in training workshops and presented their work at the International Conference on Building Resilience 2020. As for future plans, these universities have been partners in the recently submitted (in responding to 2019 round proposals of CBHE programme managed by the Erasmus + programme) in February 2019, in taking forward some of the gaps that further needs exploration, which have been identified via CABARET. Further, there also other opportunities the partners are actively pursuing at the moment in seeking support to continue the CABARET collaboration to the future. For example, they worked closely with partners from Philippines and Sri Lanka on the sandpit group focused on evacuation planning. The University of Moratuwa are now working towards leading a research proposal on critical infrastructure management for submission in 2021, and that will include several partners from the CABARET project, including Myanmar.

4.3.11 Innovation

Like many fields, disaster research has typically been conducted in 'silos', where each discipline addresses the problem from their own perspective, and with limited cooperation with others. However, the complex nature of disaster risk, including the combination of natural, physical and socio-economic vulnerabilities that leave many communities exposed, has shown this approach to be unsuccessful in promoting disaster resilience. The Sendai Framework for Disaster Risk Reduction 2015 highlights the shortcomings of existing practices, including the lack of researchers and professionals that have experience of multi-disciplinary environments, or who are equipped with the skills and abilities to tackle the complexity of disaster risk in their research. The innovative element of CABARET has been to address this problem through bringing researchers from traditionally separate disciplines together in a multidisciplinary environment and to provide researchers with the skills and experience to conduct disaster resilience research.

The Innovation hub for CABARET (WP4) has stimulated cooperation among partners on several priority areas for Asia that were identified through the capacity gap analysis in WP1. These included: public-private partnerships in major infrastructure projects such as ports; evacuation planning for marginalised groups; multi-hazard early warning; sustainability and resilience in the built environment - remote regions, island archipelagic states; local government and risk mapping; and disaster resilience education. These groups were all multi-institution, international and multi/inter disciplinary, providing fresh perspectives on emerging challenges, but also sharing practices across the region. This is demonstrated by the large number of research papers and outputs produced by these groups and which provided comparative studies across the CABARET partnership.

A large proportion of disaster resilience research focused on Asia is often produced in other regions (e.g. Europe and North America), however CABARET aimed to build capacity for Asian HEIs to conduct their own domestic research effectively, as well as to promote international collaboration through strengthening the links between partner institutions and HEIs in Europe. The project has been innovative in its focus on knowledge sharing between partners as opposed to more traditionally employed knowledge transfer approaches. Furthermore, in order to deliver targeted research with impact, the involvement of industry and policy makers is important, a fact that is becoming more well recognised but one that remains frequently overlooked within HEIs. Through a dedicated work package on socio-economic actors, CABARET has contributed to building the linkages needed to progress addressing the needs of society through research. A further innovative aspect of CABARET was to develop novel training materials on emerging challenges that are available for open access on a dedicated KnowledgeHub that was developed through a previous EU project, ASCENT.

4.3.12 Curriculum development

CABARET aimed to improve the knowledge, skills and competencies of HEI staff in the fields associated with multi-hazard early warning and disaster resilience in coastal communities, and in developing regional cooperation and stronger links between HEIs and socioeconomic actors. Firstly, through WP1, an assessment of capacity needs was conducted at the institutional, national and regional level. These were published as five national position papers and a regional position paper. From the identified needs, a specially tailored training programme was developed in order to deliver targeted training and capacity building. These were delivered through three work packages across four international workshops involving 319 participants:

- WP4: Training events on Enhancing Disaster Resilience Education in Asia; Gaps in Evacuation Planning for Coastal communities – Case Studies in Myanmar, Sri Lanka & Philippines; Local Government and Risk Mapping at the Local Level; PPP Initiatives To improve Coastal resilience in Harbour projects; Disaster and Climate Change Resilience in Small States Islands & Archipelagic States & Remote Coastal Regions; multi-hazard early warning.
- WP5 Regional cooperation: Examples of effective and non-effective inter intra regional cooperation from different regions; Identify opportunities and barriers which may exist in regional cooperation; Identify measures / actions which can be proposed in the short term and in the long term. Training focused on how to: work together across international borders by increasing capacity for regional cooperation; encourage scientists to engage with international funding opportunities; help embed international perspectives with partner countries' innovation strategies; equip HE staff with the necessary skills, methods, data and resources needed to collaborate internationally or undertake international comparative work; improve the knowledge and abilities of the individuals involved in international co-operation.
- WP6 Socio-economic actors: Capacity building on partnership with socioeconomic actors - experiences of engagements between HEI and SEA actors in Sri Lanka, Philippines and Spain; kinds and types of assistance extended by HEI to SEA, reciprocal benefits; activities and resources required in the engagement with SEA; Strengthening Multi-hazard Early warning System of Batangas Province in the Philippines. A staff exchange programme was held, by where staff from partner countries spent time at other institutions to build inter and intra regional cooperation. Through spending time at other European and Asian universities, staff had the opportunity to develop their understanding of the education policies, practices and systems in place elsewhere.

To multiply the effect of training to ensure benefits for other staff, the KnowledgeHub virtual training platform was developed. The KnowledgeHub provides an online platform on which training modules have been made available as MOOCs. These online courses are freely available for other staff and the public to access. The MOOCs developed include: Disaster Preparedness; Introduction to Coastal Disasters; Science and Technology for Disaster Risk Reduction; Community Based Disaster Risk Management.

Staff who participated in the training sessions commonly also hold lecture or teaching positions. Partners identified that they were able to use the training received through CABARET to improve their teaching and to further develop their silibuses and course plans, thereby improving the students learning.

4.4 Impacts

4.4.1 Impacts on staff and students

- Opportunity for staff and students to participate in conferences and thereby networking (ALL)
- Co-authored joint institution, international peer reviewed publications in journals and conferences (ALL)
- Collaborate on new international and regional research proposals (ALL)
- Opportunity to develop regional networks and collaborations with academics in the field (ALL)
- Opportunity to participate in staff exchanges between Asia and EU, or within Asia (MNU, UoY, MTU, DLSU, ADMU, UoM, UoP)



- Experience working in an international environment and in different cultural settings (ALL)
- Apply the skills they gained through to develop/revise their university courses and teaching (ALL)
- Work package leadership and project management experience in an international project (ITB, AU, MNU, MTU, DLSU, UoM, UoP)
- Mentorship of early career researchers and postgraduate researchers (DLSU, ADMU, ITB)

4.4.2 Impacts on institutional level

- New disaster management taught programme being developed (MNU)
- Greater capacity of staff to conduct research in MHEW and disaster resilience (ALL)
- Training of officials from the finance divisions on European commission funding arrangements (ALL)
- Stronger linkages with socio-economic actors (UoM, MNU, UoY, ADMU)
- Increase in MHEW and disaster resilience research (ALL)

4.4.3 National or regional level

- Improved understanding, awareness and attitudes among national and subnational actors on the critical areas of capacity for effective end to end tsunami early warning
- Changed the decision-making and behaviour of national and subnational actors in Indonesia, the Maldives, Myanmar and Sri Lanka
- Capacity building survey results are informing on-going evaluation of capacity and standard operating procedures across the twenty-eight member states of the IOTWMS
- Detailed empirical studies and comparison of four partner countries, including Indonesia, the Maldives, Myanmar and Sri Lanka - the studies identified the current status of the four countries against the twelve areas of tsunami early warning capacity, as well as shortcomings in the end-to-end warning chain and standard operating procedures.
- At the national and sub-national level, the studies in Sri Lanka and Indonesia have resulted in changes to the standard operating procedures to help workers carry out complex routine operations involved in receiving regional dissemination and warning information, evaluating against pre-defined criteria, and disseminating and enacting the response through sub national actors
- Supported a regional Task Team on "Capacity Development for Tsunami Preparedness", set up to establish and implement working plans in the Indian Ocean region and guided implementation of a survey for capacity assessment of tsunami preparedness in the Indian Ocean region. Using the analytical framework developed through CABARET, they designed the capacity survey tool that in November 2018 was issued, by the ICG/IOTWMS, to all 28 members states.

4.5 Dissemination

A large number of measures have been taken by all partner country beneficiaries to disseminate the project on various levels. At faculty/institution level, information was made available on partner institutions' websites. Project details were also shared within the beneficiary institutions via email statements, poster and via the distribution of flyers. Opportunities to present the project progress at different levels of its cycle were also actively pursued.

For dissemination at the local level, the project brief was translated into local languages of the partner countries and promoted through institutional events and websites. Two infographics were produced to provide a diagrammatic and easy to understand overview of the project and its goals.

Seven policy dialogues were conducted, for examples at the national level with the Association of Disaster Risk Management Professionals in Sri Lanka, August 2018, and at the regional level with key stakeholders at the ICG/IOTWMS meeting, 29 Sept-2 Oct 2019, Jakarta, Indonesia.

At the international level, CABARET was partnered with the 7th, 8th and 9th International Conferences on Building Resilience, held in Thailand (300+ participants), Portugal (200+ participants) and Indonesia (180+ participants and for which ITB was the local host). These provided key dissemination forums for the project. In Indonesia, and 49 papers were submitted and presented by CABARET researchers, many of which are being published in peer reviewed journals and books. The event also involved policy dialogues and panel discussions, workshops and keynote addresses with national and regional actors, including BMKG, BNPB, ADPC and IOC UNESCO Indian Ocean Tsunami Warning and Mitigation System. A flyer, infographics and event specific website pages were produced. CABARET also organised a panel discussion at the ASCENT Festival in January 2019 on MHEW and technology, which included the participation of Sri Lankan actors such as the Disaster Management Centre and Dialog mobile communications.

On a global scale, partner institutions held a range of events and activities across Europe and Asia linked to multi-hazard early warning and to coincide with the International Day for Disaster Reduction (IDDR). Rahayu (ITB) represented and presented CABARET at the IOC/UNESCO Symposium, held in the UNESCO Headquarter in Paris-France on 12-14 February 2018. Haigh and Amaratunga presented CABARET at the Multi-Hazard Early Warning Conference held as part of the UN Global Platform in Cancun, Mexico in May 2017.

Material was also produced promoting the project: flyer; institutional websites; press releases; pull ups and banners used at events; 6 newsletters; 10 posters displayed at international events including UN Global Platform, IOC-UNESCO Symposium; 2 infographics; International Conference on Building Resilience Proceedings, Books of Abstracts; ASCENT Festival book of abstracts; Policy Briefs for Sri Lanka and Myanmar; Facebook Page; Newspaper article; 40 news articles on websites; 76 presentations by CABARET partners; 55 peer reviewed scientific abstracts and papers on MHEW and disaster resilience published by CABARET partners.

The Project website can be accessed at: <http://cabaret.buildresilience.org>. The website will be hosted for a minimum of three years after the project end date and for at least twelve months will be populated with ongoing news linked to the project outcomes.

4.6 Sustainability

Several new projects have been submitted for funding by CABARET partners topics to emerge from the WP4 innovation hub. Some examples include:

- BRITAE, Erasmus+, UoM, HUD
- Newton Prize Indonesia - Harmonising tsunami early warning at the local level, HUD and ITB
- [Indonesia] Mitigating hydro meteorological hazard impacts, NERC / ESRC / RISKTEKDIKTI, ITB and HUD
- Governance of the upstream-downstream interface in end-to-end tsunami early warning systems, UK Global Challenges Research Fund, HUD, UoM, ITB, MNU, UoY.

Several project proposals have been developed and submitted to funding bodies:

- CANDID, Erasmus+, HUD, IHC, UoM, AU, ITB, ADMU, MTU, UoY and MNU
- SECRA, Erasmus+, UoP, DLSU, MTU, UoY, MNU and HUD
- Displacements due to Disasters, Erasmus+ ICM, HUD, UoM and UoP
- Mitigating hydro meteorological hazard impacts, EC Erasmus+ ICM, HUD, ITB, AU.

There are several further proposals are under development.

In the Maldives, MNU is incorporating CABARET MOOCs into its taught programme on disaster management, which will be launched in 2020.

In Sri Lanka, UoM is collaborating with the country's Disaster Management Center Dialog communications on a series of projects linked to technology in MHEW in an effort to improve communication of early warning messages.

Representatives from ITB (Chair) and HUD (members) sit on Working Group 1 - Tsunami Risk, Community Awareness and Preparedness of the IOC-UNESCO IOTWMS. The findings of the project are informing capacity building activities of the regional early warning system.

4.6.1 Multiplier effect of the project

WP7 contributed to an online training platform, the KnowledgeHub, on which MOOCs have been archived. The virtual training platform is freely available online, allowing anyone wishing to develop their skills in MHEW. The MOOCs on the Knowledge Hub provide a platform for those outside of the consortium to also access the educational materials that were developed.

The 7th, 8th and 9th International Conferences on Building Resilience 2017/18/20, and the ASCENT Festival held in January 2019 were major international dissemination events which provided a platform for the dissemination of CABARET findings to other institutions/other users outside the partnership.

Two policy briefs, aimed at Myanmar and Sri Lanka, were developed for national priorities on MHEW and coastal resilience, as well as the role of HEIs in achieving these goals. These were put in place to drive the national strategies on capacity building and were promoted through dissemination events.

The "Symposium on Creating University-Industry Links" was held on 12th March 2018 at the Ministry of Primary Industries, Battaramulla, Sri Lanka. The symposium was jointly organized by the Ministry of Primary Industries (MOPI), Sri Lanka and University of Central Lancashire (UCLan), UK in partnership with CABARET (Capacity Building in Asia for Resilience Education) Prof. K.D.N. Weerasinghe – Consultant of MOP, and Dr. Champika Liyanage – Reader at UCLan, were the co-chairs of the Symposium. The symposium brought together more than 60 academics, policy makers, industry professionals and financial institutions involved in university – industry collaborations. The event consisted of several inaugural speeches from distinguished invitees, thematic presentations of related to university – industry links and a final roundtable discussion. The symposium unveiled a number of practical implications to develop university – industry links based on both Sri Lankan and UK experiences. During the roundtable discussions, current status, best practices and challenges related to creating university – industry linkages in Sri Lanka were discussed in-detail. The symposium concluded by identifying prospective policy priorities to improve university – industry linkages in Sri Lanka.

CABARET established synergies with the ASCENT project, also funded by Erasmus+ CBHE. Similar to CABARET, ASCENT aimed to build R&I capacity among HEIs on disaster resilience in Asia. The project was also led by the University of Huddersfield and included project partners the University of Moratuwa and University of Central Lancashire. The projects undertook several joint dissemination events, such as CABARET holding a panel discussion during the ASCENT festival, and also shared the "Knowledge Hub" which hosts the MOOCs and OERs produced by both projects. This enabled a multiplier effect and cost efficiency for both projects, also allowing cross-pollination of ideas and outcomes, and extending the benefits of CABARET to other Asia Region 6 countries, through ASCENT partners in Bangladesh and Thailand.