



## **Work Package 5: Inter – Intra Regional Cooperation**

# **The Development of Inter and Intra Regional Cooperation Frameworks for MHEW in South-East Asia**

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### **SUMMARY – WORK PACKAGE 05**

The CABARET Project (Capacity Building in Asia for Resilience EducaTion), aims at providing support to build capacity for international and regional cooperation between Higher Education Institutes (HEIs) in South-East Asia and Europe, and among Asian HEIs themselves. The project aims at improving multi-hazard early warning (MHEW) and increase disaster resilience amongst coastal communities in South East Asia. Events such as the 2004 Indian OceanTsunami highlighted the transboundary nature of some coastal hazards and the importance of regional cooperation. Inter and Intra regional cooperation were addressed in Work Package 5 within the CABARET project with the aim of addressing capacity building in the region. The main objective of Work Package 5 within the CABARET project was to develop a capacity building roadmap based on inter and intra regional cooperation as a means to improve multi-hazard early warning systems and disaster resilience (MHEW) amongst coastal communities in South-East Asia. This objective was addressed through different Workshops among stakeholders of five South-East Asia countries participating in the project, including Indonesia, Maldives, Myanmar, the Philippines and Sri Lanka. The initial data generated in the first workshop organised in Yangon Myanmar during 2018, brings out the gaps and common grounds that underlie the possibilities of inter and intra regional cooperation. Different stakeholders from participating countries assessed inter and intra regional cooperation at different levels as a means to provide a baseline scenario to develop a capacity building roadmap for such cooperation. The discussions organised through structured face-to-face encounters considered cooperation at different scales: International and Regional, National and Local. The stakeholders identified barriers and priorities that may underlie such collaborations

for both urban areas and remote locations. The short-term and long-term dimensions were also addressed within this context. The workshop led to the development of a conceptual Framework for inter and intra regional cooperation, referring to key aspects that include resources available, cultural preparedness, technical compatibility and political scenarios. The second Workshop was based on the outcomes of the first Workshop and was planned on the ‘capacity to act’ approach, so as to find ways how to shift from policy documents to action plans. The over-arching idea of the second Workshop discussions organized in Manila the Philippines during 2019, was to improve the Capacity Building of Higher Education Institutions (HEIs) to address Disaster Resilience by focusing on specific Frameworks that would provide guidelines on how to improve collaboration among HEIs. The Frameworks under discussion included knowledge databases, data sharing and resource sharing and exchange education programmes. MHEW for more resilient coastal communities is increasingly complex in view also of the discourse related to sustainable living that include the wider economic and social environments. The Framework for inter and intra regional cooperation are at different scales; from local to regional and the international dimensions and even through a bottom-up approach, together with the experts’ and managing authorities’ top-down positions.

## 1 INTRODUCTION

The CABARET Project (Capacity Building in Asia for Resilience EducaTion), aims at providing support to build capacity for international and regional cooperation between Higher Education Institutes (HEIs) in South-East Asia and Europe, and among Asian HEIs themselves. The project aims at improving multi-hazard early warning (MHEW) and increase disaster resilience amongst coastal communities in South East Asia. Events such as the 2004 Indian Ocean Tsunami highlighted the transboundary nature of some coastal hazards and disasters and the importance of regional cooperation. Multi hazard early warning systems have been given greater importance in the aftermath of the 2004 Indian Ocean tsunami and other major events in the South-east Asia Region.

The objectives of the research undertaken are to assess the implementation of Multi-Hazard early warning systems in South East Asian countries namely Indonesia, Sri Lanka, Philippines, Maldives, Myanmar, and to assess the importance of inter-regional and intra-regional cooperation. The research also reviews the role of higher education institutions in promoting inter and intra regional cooperation (Note: Intra-regional cooperation refers to exchange primarily between countries of the same region or economic zone; Inter regional refers to cooperation between different regions). Inter and Intra regional cooperation were addressed in Work Package 5 within the CABARET project with the aim of addressing capacity building. The main objective of Work Package 5 within the CABARET project was to develop a capacity building roadmap based on inter and intra regional cooperation as a means to improve multi-hazard early warning systems and disaster resilience (MHEW) amongst coastal communities in South-East Asia.

The discussions regarding the Framework take into consideration inter and intra regional cooperation at different scales; from local to regional and to the inter regional dimensions and does not overlook the importance of a bottom-up approach by including the local communities and the experts’ and Managing Authorities’s top-down positions. Moreover, the discussions about MHEW for more resilient communities was broadened into an increasingly more complex conversation in view also of the discourse related to sustainable living.

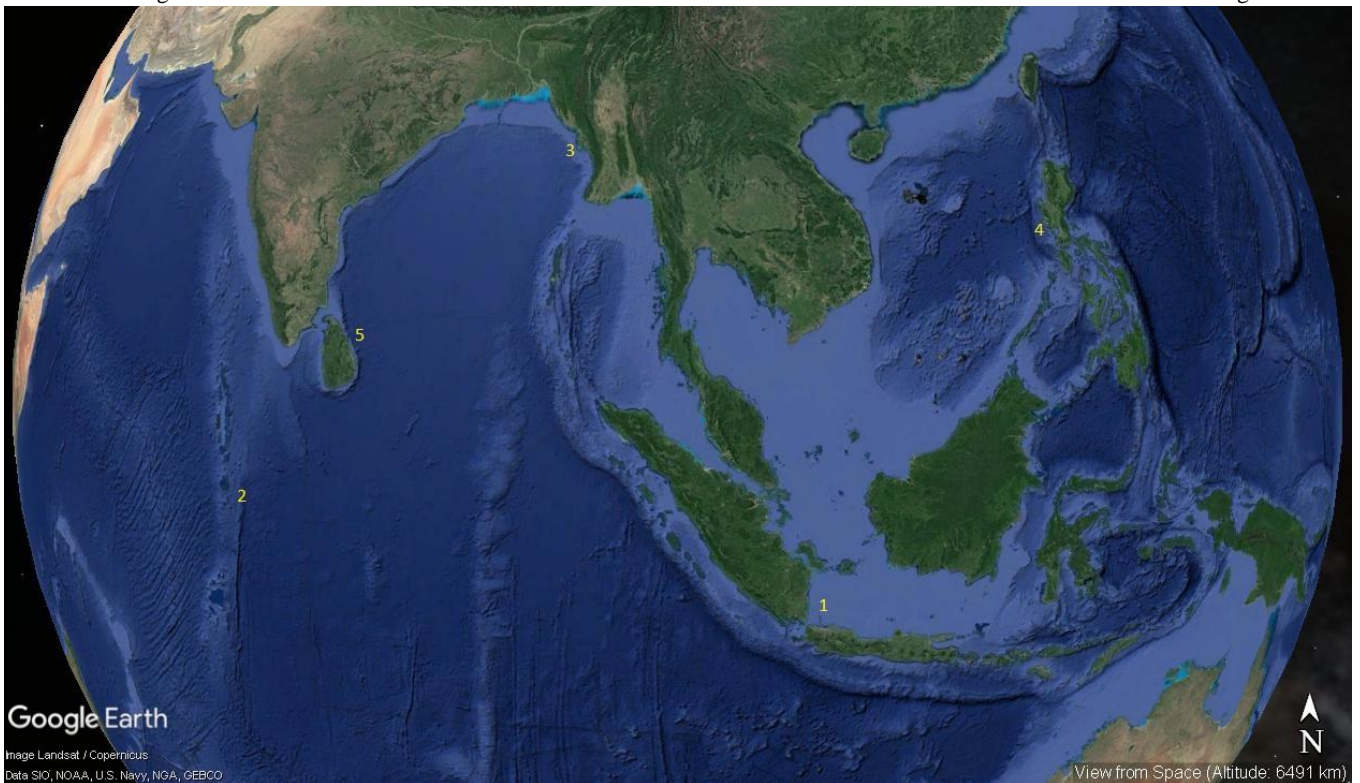


Figure 1; South East Asia, CABARET Project Partner Countries in South East Asia (1; Indonesia, 2; Maldives, 3; Myanmar, 4; Philippines, 5; Sri Lanka).

The first part of the study was intended to define gaps and priority areas in Multi-Hazard Early warning systems. This referred to a review of national position papers developed for each Asian country participating within the CABARET Project, based on interviews and Focus Groups. The assessment of inter and intra-regional cooperation was further developed in facilitated Workshops composed of experts from the 5 Asian countries and European partners, intended to analyse gaps in inter and intra-regional cooperation and the role of Higher education institutions in promoting cooperation. This objective was addressed through different Workshops among stakeholders of the five South-East Asia countries participating in the project (Indonesia, Maldives, Myanmar, Philippines and Sri-Lanka).

The initial data generated in the first workshop organised in Yangon Myanmar during 2018, brings out the gaps and common grounds that underly the possibilities of inter and intra regional cooperation. Different stakeholders from participating countries assessed inter and intra regional cooperation at different levels as a means to provide a baseline scenario to develop a capacity building roadmap for such cooperation. The discussions organised through structured face-to-face encounters considered cooperation at different scales: International and Regional, National and Local. The stakeholders identified barriers and priorities that may underlie such collaborations for both urban areas and remote locations. The short-term and long-term dimensions were also addressed within this context. The workshop led to the development of a conceptual Framework for inter and intra regional cooperation, referring to key aspects that include resources available, cultural preparedness, technical compatibility and political scenarios.

The second Workshop was based on the outcomes of the first Workshop and was planned on the 'capacity to act' approach, so as to find ways how to shift from policy documents to action plans. The over-arching idea of the second Workshop discussions organized in Manila the Philippines during 2019, was to improve the Capacity Building of Higher Education Institutions (HEIs) to address Disaster Resilience by focusing on specific Frameworks that would provide guidelines on how to improve collaboration among HEIs. The Frameworks under discussion included knowledge databases, data sharing and resource sharing and exchange education programmes.

## **2 CAPACITY BUILDING IN ASIA FOR RESILIENCE**

Following the Indian Ocean tsunami of 2004, countries from within and outside the region quickly worked together to build the Indian Ocean Tsunami Warning and Mitigation System (IOTWS) [2]. 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 built capacity to broaden early warning to provide a comprehensive, multi-hazard Framework.

Experience over recent years of the impacts of coastal hazards such as tsunamis, storm surges, sea level rise and coastal erosion, has shown that inadequate preparation for, and response to, emergency situations have contributed to widespread damage and the avoidable loss of lives and livelihoods [1]. These hazards set back economic development in both developed and developing economies and tend to disproportionately affect the most vulnerable in society. 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.

Recent studies and practical experiences of hazards suggest that more attention needs to be paid to the cognitive and normative challenges in positioning early warning systems and preparedness in the wider context of social change in the coastal societies and communities at risk. Better and more innovative platforms for knowledge sharing need to be established to enable stakeholders to collectively negotiate these challenges, to improve the integration of early warning with other priorities such as livelihoods improvement, natural resource management and community development, and to provide opportunities for critical reflection of 'on-the-ground' experiences and lessons learnt [1].

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. This further highlights the importance of intra-regional and inter-regional cooperation in the region.

The UN Sendai Framework for Disaster Risk Reduction [3], 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 the local to the global levels. It also calls for the coordination of existing networks and scientific research institutions at all levels and all regions. The goal is to strengthen the evidence-base in support of the implementation of the new Framework. Researchers and educators 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 [1].

Working closely with existing efforts to build early warning in the region, including IOC/UNESCO that is coordinating the IOTWS, the overall goal of this initiative is to build capacity within Higher Education that develops a regional, self-perpetuating fund of knowledge and

experience in MHEW, and the development of more resilient coastal communities. The CABARET project inscribes itself in the modernisation, development and internationalisation strategy of the targeted higher education institutions.

The CABARET Project, aims to build capacity for international and regional cooperation between Higher Education Institutes (HEIs) in Asia (region 6) and Europe, and among Asian HEIs themselves, to improve multi-hazard early warning (MHEW) and increase disaster resilience among coastal communities. The partners in the project include HEI from Indonesia, Maldives, Myanmar, Philippines and Sri Lanka. The communities in the five countries in Asia are highly exposed and vulnerable to the threat posed by multiple coastal hazards [1].

### *Indonesia*

Indonesia has growing coastal populations and the country is located at one of the most active geological subduction zones in the world. It includes several thousands of islands. Future tsunamis are likely to occur due to increased tectonic tensions leading to abrupt vertical sea floor alterations.

### *Maldives*

The Maldives include several islands in atolls, dispersed over a large region. 80% of the land area of Maldives is less than one meter above sea level and the Maldives is identified as one of the most vulnerable countries globally, to climate change and sea level rise.

### *Myanmar*

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.

### *Philippines*

The Philippines is a tropical archipelagic nation and is particularly susceptible to coastal hazards, which are also being exacerbated by climate change. The 2014 World Risk Report identifies the Philippines as the third most hazard exposed country in the world, and the second most at risk.

### *SriLanka*

Sri Lanka was one of the countries most affected by the 2004 tsunami. In addition, coastal erosion has been accelerated due to upstream anthropogenic activities and poorly planned coastal infrastructure development.

An overview of the main hazards of importance in the five Asian countries (Indonesia, Maldives, Myanmar, Philippines, Sri Lanka) is presented in Table 1.

Table 1: Hazards in Asian Countries [5]

Hazards	Indonesia	Maldives	Myanmar	Philippines	Sri Lanka
Tsunami	•	•	•	•	•
Earthquake	•	•		•	
Sea erosion	•	•		•	•
Floods	•	•	•	•	•
Landslide	•			•	•
Storms and Cyclones	•	•	•	•	
Volcanoes	•			•	

### 3 INTER AND INTRA REGIONAL COOPERATION

The objective of the CABARET Project WP5 was to develop capacity to increase international cooperation by partner HEIs to tackle ways to enhance MHEW, with a focus on strengthening of regional relationships between HEIs and the wider economic and social environment. WP5 aims at developing a roadmap towards addressing regional gaps and priorities in Asia (informing actions at the regional level), as well as raise awareness of the importance of, and means by which, regional cooperation can take place (building capacity at the institutional level) [1].

This action directly addresses some of the challenges set out by the United Nations Economic and Social Commission for Asia and the Pacific (E/ESCAP/CDR(4)/2), which stresses the importance of a regional approach [4]. 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. While significant progress has been achieved in strengthening MHEW for tsunami and tropical cyclones, important gaps exist for other hazards even though the necessary technology is increasingly more available [1]. Consequently, many countries in the Asian region are calling for 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, sharing costs, and addressing transboundary disasters.

A regional MHEW system is an example of a public good for the region. The use of such a system by one country does not prevent other countries from using the same system and benefitting from it in a similar way. On the contrary, greater participation in regional warning systems tends to 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 organizations. Through improved regional cooperative mechanisms on MHEW, countries can 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.

## 4 METHODOLOGY

As explained above, the main objective of the research activity was to develop a capacity building roadmap towards improved inter- and intra- regional cooperation in HEIs as a means to improve multi-hazard early warning systems and disaster resilience (MHEW) amongst coastal communities in South-East Asia.

The methodology refers in the first stage to the country national position papers developed in the CABARET project by the respective country HEI experts with the intention of identifying gaps in different countries.

Different workshops were organised strategically in order to identify barriers and opportunities first, and then to identify opportunities for the capacity to shift from policy to action. The research methodology developed was based on phases as outlined in Table 2.

Table 2; Research Methodology, Workshops organised in different phases of the research.

Stage	Workshop	Workshop Objectives	Location & Period
1	Base Study	Based on Country Position Papers at National Level: intended to analyse gaps in inter and intra-regional cooperation and the role of Higher education institutions in promoting cooperation.	Sri Lanka, March 2018
2	Workshop 1	Identification of barriers and priorities for Intra and Inter Regional Cooperation; development of a baseline for a capacity building roadmap; Addressing cooperation at different scales: International and Regional, National and Local.	Myanmar, October 2018
3	Workshop 2	Addressing the capacity to act, so as to find ways how to shift from policy documents to action plans; focusing on specific Frameworks that would provide guidelines on how to improve collaboration among HEIs.	Philippines, March 2019

### 4.1 Baseline Study (SriLanka)

The first part of the study was intended to define gaps and priority areas in Multi-Hazard Early warning systems and referred to a review of national position papers developed for each Asian country participating within the CABARET Project, based on the survey conducted in the first phase of the project. The analysis was conducted with reference to the national position papers, during a strategic workshop in Sri Lanka during March 2018 with the participation of representatives of the 5 countries.

### 4.2 First Workshop (Myanmar): Barriers and Priorities

The initial data generated in the first workshop organised in Yangon Myanmar during 2018, brings out the gaps and common grounds that underly the possibilities of inter- and intra- regional cooperation. Different stakeholders from participating countries assessed inter and intra regional cooperation at different levels, as a means to provide a baseline scenario to develop a capacity building roadmap for such cooperation. The discussions organised through structured face-to-face encounters considered cooperation at different scales: International and Regional, National and Local. The stakeholders identified barriers and priorities that may underlie such collaborations for both urban areas and remote locations. The short-term and long-term dimensions were also addressed within this context. The workshop led to the development of a conceptual Framework for inter and intra- regional cooperation, referring to key aspects that include resources available, cultural preparedness, technical compatibility and political scenarios.

In the first Workshop, the method followed was based on the following steps:

1. Review of the country position papers based on the survey conducted in the first phase of the CABARET Project.
2. Definition of priority areas for Inter and Inter-Regional Cooperation Assessment
3. Workshop activities (Yangon Myanmar, 2018)

The method was based on Focus Group discussions with each Focus Group composed of different experts from 5 Asian countries namely: Philippines, Myanmar, Maldives, Indonesia, Sri Lanka. In addition, each FocuG group included experts from European countries. Six Focus Group discussions were conducted during the CABARET Workshop at the University of Yangon, Myanmar during September 2018. Each Focus Group was conducted in parallel and consisted of an international group with experts from the following Regions: South East Asia and Europe including the following countries: European countries: UK, Malta, Latvia, Bulgaria, Spain and Asian countries: Philippines, Sri Lanka, Myanmar, Indonesia and Maldives. Each group consisted of participants from different countries and regions.

The Focus Groups addressed the following 6 key areas:

- A. Examples of effective inter- intra- regional cooperation from different regions
- B. Identify barriers which may exist in regional cooperation.
- C. Identify measures / actions which can be proposed in the short term and in the long term.
- D. Identify differences and particular challenges in the case of Urban Areas and (small) islands archipelagos. (Including any special considerations)
- E. Suggest key proposals to improve regional cooperation
- F. Identify the role of HEIs in improving Inter- Intra regional cooperation.

#### **4.3 Second Workshop (Philippines): Policy to Action Plans;**

The second Workshop was based on the outcomes of the first Workshop (Yangon Myanmar, 2018) and was planned on the capacity to act approach, so as to find ways how to shift from policy documents to action plans. The over-arching idea of the second Workshop discussions organized in Manila the Philippines during 2019, was to improve the Capacity Building of Higher Education Institutions (HEIs) to address Disaster Resilience by focusing on specific Frameworks that would provide guidelines on how to improve collaboration among HEIs. The Frameworks under discussion included knowledge databases, data sharing and resource sharing and exchange education programmes.

The proposal for the second Workshop 2 (Manila Philippines, 2019) was based on the outcomes of the discussions of the first Workshop (Yangon Myanmar, 2018). In view of the overall objective of the Cabaret Project: Disaster Resilience and Disaster Risk Reduction, Early Warning Systems, the second Workshop is based on the Capacity to Act. The paradigm is to find ways how to shift from policy documents to action plans.

The discussions are meant to focus on HEIs since a number of partners in CABARET work/contribute in HEIs but still collaborate with national or international agencies and government entities that address disaster management. Moreover, it is assumed that the ultimate aim of HEIs is to enhance research that allows space for collaborations at various scales irrespective of specific political or other agendas.

The underlying principle of the workshop discussions was to build on the ‘capacity to act’. The idea was to outline a set of Frameworks that would provide guidelines to improve the collaboration, further to the barriers that were identified in the first Workshop.



The common themes refer to Frameworks identified as listed below:

1. Framework for creating knowledge databases, data sharing and resource sharing
2. Framework for research for innovation in disaster management
3. Criteria for country assessment regarding Disaster Resilience, DRR (Disaster Risk reduction) and EWS (Early Warning Systems)
4. Framework for partnerships and joint research
5. Framework to initiate and exchange education programs to increase the capacity building of various stakeholders.
6. Framework to establish long-lasting policy programs to share mechanisms for best practices.

The Workshop was conducted with six Focus Groups, each including experts from different South-East Asian countries and addressing one of the six areas outlined above. In order to allow for a comprehensive discussion that includes various stakeholders the Focus Groups were led to consider their proposals at different scales of collaboration from local to regional to inter-continental dimensions. The groups were to assess at the different three scales that is: local, intra- and inter-regional cooperation. In Workshop 1 in Myanmar, the role of the public and the local communities including traditional practices were referred to as a ‘gap’ area to address. Therefore, the discussions in Workshop 2 in the Philippines was intended to take into consideration a bottom-up approach together with the experts’ positions that usually entails a top-down approach to setting up of different Frameworks as a means to address the gaps identified in Workshop 1..

## **5 INTER AND INTRA REGIONAL COOPERATION**

### **5.1 Gaps and Priority Areas for Cooperation**

Regional Cooperation in Asian countries was identified in the first assessment through interviews and Focus Groups [5].

- Indonesia: Indian Ocean Tsunami Warning and Mitigation System (IOTWMS), WMO (World Meteorological Organization), AHA Center ACDM (ASEAN Coordinating Disaster Management at the Ministry Level);
- Myanmar: regional cooperation with partner organizations from ASEAN (Association of Southeast Asian Nations) especially ASEAN Humanitarian Assistance Centre (AHA Centre) located in Jakarta, Indonesia;
- Philippines: Philippines forms part of two regional partnerships that support effective MHEW and disaster resilience, i.e. ASEAN and Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES).
- Sri Lanka: Sri Lanka is a member of the Asia Pacific Alliance for Disaster Management (APADM); Regional Specialized Meteorological Centre (RSMC) for tropical Cyclones over North Indian Ocean; RIMES; IOTWMS.

The study led to the identification of main gaps through the national position papers, which were organised in six groups:

- Technological gaps
- Policy and Governance
- Education, Training and Awareness
- Communication, Coordination and Collaboration
- Funding and Financing
- EWS Related

In the national position papers study, the Multi-stakeholder collaboration and networking, emerged as an important outcome of the analysis. This emphasises the importance of cooperation within countries but also across countries and regions leading to the assessment of inter and intra-regional cooperation.

## 5.2 Barriers and Priorities

The barriers and priorities identified in the first workshop were organised into three key groups: Political / Institutional / Cultural Barriers; Role of HEIs, Communication. Table 3 summarizes the main outcomes from the discussions of the Focus Groups in the first Workshop. These outcomes have been analysed and organized in three main areas, considered as the key areas which were identified for collaboration practices for different stakeholders at Inter and Intra regional scales.

Table 3; Barriers and Priorities for Intra and Inter regional cooperation.

<b>Political/Institutional/Cultural Barriers</b>	<b>Role of HEIs</b>	<b>Communication</b>
Language	Need for research on innovation and disaster management	Different technologies – not compatible
Cultural Attitude	Need for consultation	Need of a common evaluation criteria and regulations
Geopolitical Conflict and Trust	Need of collaboration	Need of create knowledge databases
Difference in Political Ideology	Need of training of various stakeholders	Data sharing issues
Economic Diversity	Need for interactive network	Resource Sharing Issues
Lack of funding that reflect political commitment	Need for data and information sharing programs	
Personal Agendas	Need to exchange programs and partnerships	
Lack of implementation	Need of joint research and PhD programs	
Adopting and Adhering International Agendas	Need of long-lasting research and policy programs	
	Creating of research centres	
	Need to share mechanisms and best practices	
	Need to conduct workshops in capacity building programs	

Although some of the outcomes are listed separately in the three key areas identified, there are definitely a number of these points that are relevant and may be included under the other headings due to common overlaps as indicated in Figure 2. It is noted that the role of HEIs features prominently in the assessment, also in view of the expert participants’ activity in HEIs.

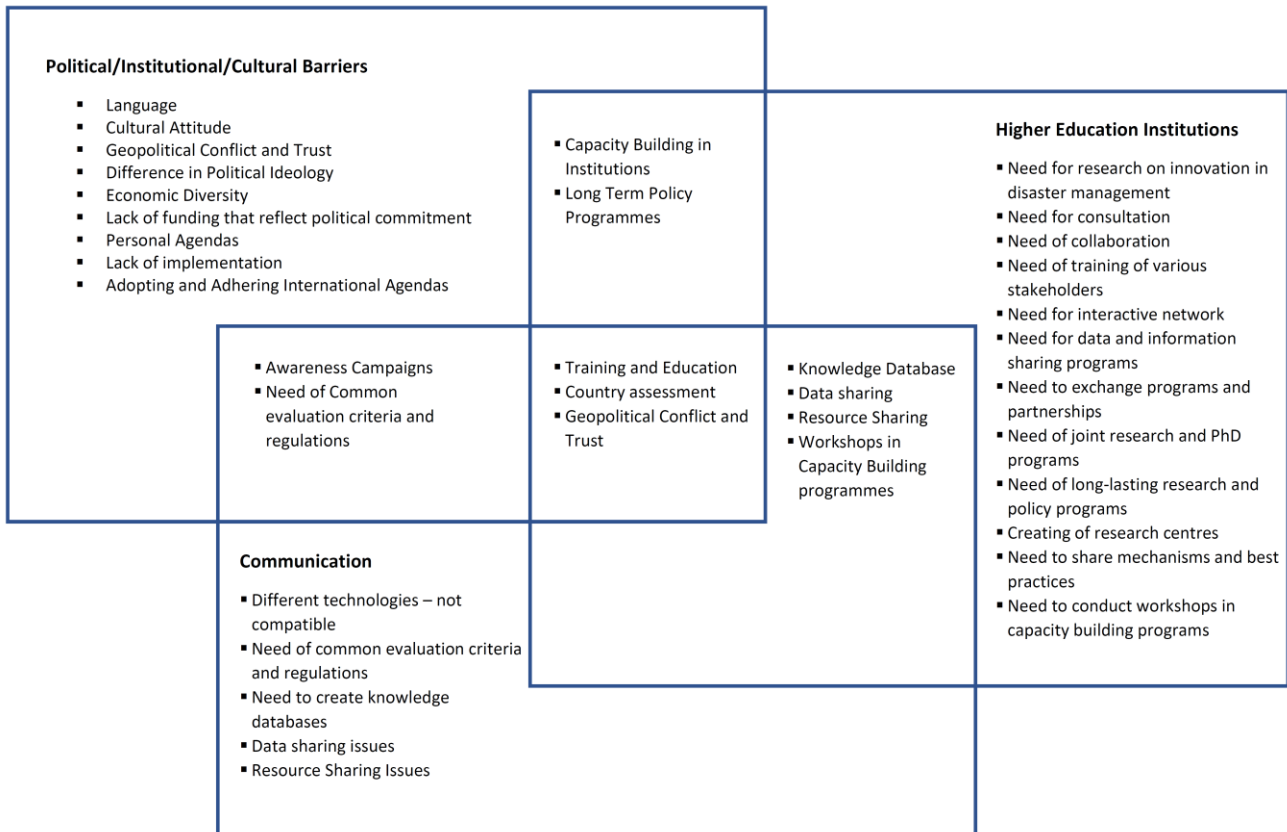


Figure 2; Main Areas, Barriers for Inter and Intra Regional Cooperation.

### 5.3 Policy to Action Plans

On the basis of this assessment, the main Frameworks to focus on, as part of the project, were identified as outlined in the Tables below (Tables 4 to 9). These were used as the basis of the second Workshop organised in Manila, Philippines. In the second Workshop, the experts were able to discuss each Framework with respect to the following scales: Local; Intra Regional; Inter regional cooperation.

Furthermore the experts through the Focus Groups discussions were able to address the possibilities for implementation, to identify barriers and provide where relevant the right examples to support the proposed implementation measures, therefore transforming the Policy Framework into concrete action.

Table 4; Framework for creating knowledge databases, data sharing and resource sharing

<b>1. Framework for creating knowledge databases, data sharing and resource sharing</b>		
<b>Local Cooperation</b>	<b>Intra-regional Cooperation</b>	<b>Inter regional Cooperation</b>
<b>Implementation</b>	<b>Implementation</b>	<b>Implementation</b>
1. Partnerships in data sharing	1. Partnerships in data sharing	1. Partnerships in data sharing
2. Centralised single online data sharing platform	2. Centralised single online data sharing platform	2. Centralised single online data sharing platform
3. Access to internet and good communication infrastructure	3. Access to internet and good communication infrastructure	3. Access to internet and good communication infrastructure
4. Having open data sharing policies	4. Having open data sharing policies	4. Having open data sharing policies
5. Provision of Comprehensive data storage	5. Provision of Comprehensive data storage	5. Provision of Comprehensive data storage
<b>Barriers</b>	<b>Barriers</b>	<b>Barriers</b>
1. Removing barriers for restricted information	1. Removing barriers for restricted information	1. Removing barriers for restricted information

Table 5; Framework for research for innovation in disaster

<b>2. Framework for research for innovation in disaster</b>		
<b>Local Cooperation</b>	<b>Intra-regional Cooperation</b>	<b>Inter regional Cooperation</b>
<b>Implementation</b>	<b>Implementation</b>	<b>Implementation</b>
1. Promoting integrated research between the social level and technological level	1. Promoting integrated research between the social level and technological level	1. Promoting integrated research between the social level and technological level
2. Promoting indigenous knowledge and local wisdom	2. Promoting indigenous knowledge and local wisdom	2. Promoting indigenous knowledge and local wisdom
3. To promote cultural and natural diversity	3. To promote cultural and natural diversity	3. To promote cultural and natural diversity
4. Identifying different stakeholders and contributors	4. Identifying different stakeholders and contributors	4. Identifying different stakeholders and contributors
5. Mapping the common interests to promote strong partnerships	5. Mapping the common interests to promote strong partnerships	5. Mapping the common interests to promote strong partnerships
6. Building knowledge management	6. Building knowledge management	6. Building knowledge management
7. Utilize technology to enhance communication	7. Utilize technology to enhance communication	7. Utilize technology to enhance communication
8. Establishment of research centers	8. Establishment of research centers	8. Establishment of research centers

Table 6; Criteria for country assessment regarding Disaster Resilience, DRR and EWS

<b>3. Criteria for country assessment regarding Disaster Resilience, DRR and EWS</b>		
<b>Local Cooperation</b>	<b>Intra-regional Cooperation</b>	<b>Inter regional Cooperation</b>
<b>Implementation</b>	<b>Implementation</b>	<b>Implementation</b>
1. Interview (Stakeholders)	1. Common Languages	1. Aid (Technical, Funding)
2. Study the Framework (if available)	2. Resources sharing	2. Communication
3. Visits and Observation	3. Joint study	3. Government policies
4. Communication	4. Sharing best practices	4. Information legacy
		5. Training of locals
		6. Sharing of experts
<b>Barriers</b>	<b>Barriers</b>	<b>Barriers</b>
1. Language	1. Government policies	1. Openness of government
2. Religion (eg caste)	2 Politics	2. Languages
3. Geographical distribution	3. Corruption	3. Technological gap
4. Logistics	4. Magnitude of the disaster	4. Funding

Table 7; Framework for partnerships, joint research

<b>4. Framework for partnerships, joint research</b>		
<b>Local Cooperation</b>	<b>Intra-regional Cooperation</b>	<b>Inter regional Cooperation</b>
<b>Implementation</b>	<b>Implementation</b>	<b>Implementation</b>
1. Identification of research priorities of each university and whether there is the experience in each priority area, of the partnership with another university within the same country	1. Identification of research priorities of each university and whether there is the experience in each priority area, of the partnership with another university within the same country	1. Identification of research priorities of each university and whether there is the experience in each priority area, of the partnership with another university within the same country
2. Establishment of MOU and/or MOA for formal collaboration which includes:	2. Establishment of MOU and/or MOA for formal collaboration which includes:	2. Establishment of MOU and/or MOA for formal collaboration which includes:
a) Contribution of each partner	a) Contribution of each partner	a) Contribution of each partner
b) Resources shared	b) Resources shared	b) Resources shared
c) Ownership of IP	c) Ownership of IP	c) Ownership of IP
d) Funding	d) Funding	d) Funding
<b>Barriers</b>	<b>Barriers</b>	<b>Barriers</b>
1. Funding	1. Language	1. Language
2. Sustainability of project	2. Existing policies (e.g. economic)	2. Existing policies (e.g. economic)
3. Technical expertise	3.Funding	3.Funding
4. Different priorities/mismatch of priorities with that of the universities	4.Sustainability of project	4.Sustainability of project
5. Bureaucracy	5.Technical expertise	5.Technical expertise
	6. Different priorities/mismatch of priorities with that of the universities	6. Different priorities/mismatch of priorities with that of universities
	7. Politics	7. Politics
	8. Bureaucracy	8. Bureaucracy
<b>Examples</b>	<b>Examples</b>	<b>Examples</b>
1. Development of open source content	1. Sharing of technical expertise such as use of technologies or innovations	1. Sharing of technical expertise such as use of technologies or innovations

Table 8; Framework to initiate and exchange education programs to increase the capacity building of various stakeholders.

<b>5. Framework to initiate and exchange education programs to increase the capacity building of various stakeholders.</b>		
<b>Local Cooperation</b>	<b>Intra-regional Cooperation</b>	<b>Inter regional Cooperation</b>
<b>Implimentation</b>	<b>Implimentation</b>	<b>Implimentation</b>
1. Identifying common challenges	1. Identifying common challenges	1. Identifying common challenges
2. Identifying key persons and champions in resilience education	2. Identifying key persons and champions in resilience education	2. Identifying key persons and champions in resilience education
3. Continuously improving institutional capacity for resilience education and building strong local partnership	3. Continuously improving institutional capacity for resilience education and building strong partnership	3. Continuously improving institutional capacity for resilience education and building strong partnership
4. Increasing public awareness on resilience education	4. Increasing public awareness on resilience education	4. Increasing public awareness on resilience education

Table 9; Framework to establish long-lasting policy programs to share mechanisms for best practices

<b>6. Framework to establish long-lasting policy programs to share mechanisms for best practices</b>		
<b>Local Cooperation</b>	<b>Intra-regional Cooperation</b>	<b>Inter regional Cooperation</b>
<b>Implementation</b>	<b>Implementation</b>	<b>Implementation</b>
1. Centralised system and decentralised systems	1. Common platform to revise and discuss the existing policy Frameworks annually	1. Implementation of MoUs.
2. Empowering the downstream to follow the Framework.		
3. Organise town level and village level workshops		
4. Introducing policy Framework in the education systems		
	<b>Example</b>	
	The South Asian Association for Regional Cooperation (SAARC).	

## 6 FRAMEWORK FOR A CAPCITY BUILDING ROADMAP

The Framework for a capacity building roadmap can be drawn on the priority areas for implementation as derived from the assessment of the workshops conducted with the participation of experts in MHEWs from HEIs in Asia. The Framework refers to the six key areas identified through the Focus Group activity, on the basis of which action for implementation was identified together with barriers and key examples, with respect to a scale, from local to intra-regional to inter-regional.

It is expected that various key areas for implementation at the local level can be extended to the intra-regional level. In different instances key areas for implementation can also be extended to the international level. The exploitation of a common platform for discussion, sharing and revision of existing policy appears as a key principle. Sharing of knowledge, data management but also expertise and technology appear as an important key area.

Table 10; Intra and Inter Regional Cooperation strategic action – Roadmap.

Ref.	Framework	Priority Action: Local Level	Priority Action: Intra-regional Level	Priority Action: Inter-regional Level
1	Framework for creating knowledge databases, data sharing and resource sharing	<ul style="list-style-type: none"> <li>▪ Data sharing online</li> <li>▪ Communication infrastructure</li> <li>▪ Open data sharing policies.</li> <li>▪ Big data storage infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Data sharing online</li> <li>▪ Communication infrastructure</li> <li>▪ Open data sharing policies.</li> <li>▪ Big data storage infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Data sharing online</li> <li>▪ Communication infrastructure</li> <li>▪ Open data sharing policies.</li> <li>▪ Big data storage infrastructure.</li> </ul>
2	Framework for research for innovation in disaster management	<ul style="list-style-type: none"> <li>▪ Integrated research, social – technological</li> <li>▪ Indigenous knowledge</li> <li>▪ Variety of stakeholders &amp; Creating strong partnerships</li> <li>▪ Adequate knowledge management</li> <li>▪ Technology</li> <li>▪ Research centres</li> </ul>	<ul style="list-style-type: none"> <li>▪ Integrated research, social – technological</li> <li>▪ Indigenous knowledge</li> <li>▪ Variety of stakeholders &amp; Creating strong partnerships</li> <li>▪ Adequate knowledge management</li> <li>▪ Technology</li> <li>▪ Research centres</li> </ul>	<ul style="list-style-type: none"> <li>▪ Integrated research, social – technological</li> <li>▪ Indigenous knowledge</li> <li>▪ Variety of stakeholders &amp; Creating strong partnerships</li> <li>▪ Adequate knowledge management</li> <li>▪ Technology</li> <li>▪ Research centres</li> </ul>
3	Criteria for country assessment regarding Disaster Resilience, DRR and EWS	<ul style="list-style-type: none"> <li>▪ Interviews, visits and observations.</li> <li>▪ Framework review and assessment (where it exists)</li> <li>▪ Communication</li> </ul>	<ul style="list-style-type: none"> <li>▪ Resource sharing</li> <li>▪ Best practice sharing</li> <li>▪ Joint studies</li> </ul>	<ul style="list-style-type: none"> <li>▪ Support at technical and financial level.</li> <li>▪ Communication</li> <li>▪ Government policies</li> <li>▪ Information</li> <li>▪ Training</li> <li>▪ Sharing experts</li> </ul>
4	Framework for partnerships, joint research	<ul style="list-style-type: none"> <li>▪ Research priority,</li> <li>▪ Experience &amp; expertise</li> <li>▪ MoU for formal collaboration</li> </ul>	<ul style="list-style-type: none"> <li>▪ Research priority,</li> <li>▪ Experience &amp; expertise</li> <li>▪ MoU for formal collaboration</li> </ul>	<ul style="list-style-type: none"> <li>▪ Research priority,</li> <li>▪ Experience &amp; expertise</li> <li>▪ MoU for formal collaboration</li> </ul>
5	Framework to initiate and exchange education programs to increase the capacity building of various stakeholders.	<ul style="list-style-type: none"> <li>▪ Champions in resilience;</li> <li>▪ Improving institutional capacity;</li> <li>▪ Strong local partnerships</li> <li>▪ Public awareness</li> </ul>	<ul style="list-style-type: none"> <li>▪ Champions in resilience;</li> <li>▪ Improving institutional capacity;</li> <li>▪ Strong partnerships</li> <li>▪ Public awareness</li> </ul>	<ul style="list-style-type: none"> <li>▪ Champions in resilience;</li> <li>▪ Improving institutional capacity;</li> <li>▪ Strong partnerships</li> <li>▪ Public awareness</li> </ul>
6	Framework to establish long-lasting policy programs to share mechanisms for best practices.	<ul style="list-style-type: none"> <li>▪ Centralised / decentralised systems;</li> <li>▪ Empowering downstream;</li> <li>▪ Education</li> </ul>	<ul style="list-style-type: none"> <li>▪ Common Platform for revision of existing Frameworks</li> </ul>	<ul style="list-style-type: none"> <li>▪ MoUs between organisations</li> </ul>

## 7 CONCLUSION

Inadequate preparation for and ineffective response to emergency situations arising from coastal hazards and disasters, have contributed to widespread damage and the avoidable loss of lives and livelihoods. These hazards set back economic development in both developed and developing economies. 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.

In this regard, the research conducted within the objectives of Work Package 5 of the CABARET project focused on the development of a roadmap, towards addressing regional gaps and priorities in Asia and informing actions at the regional level. The activity was organised in three strategic steps, with a base study on the national position papers, and two workshops in South East Asia, with the participation of experts from five Asian countries, together with European partners, who defined the key areas and Frameworks for assessment of Intra and Inter regional cooperation. This was conducted in three key stages including the base study for the respective countries, the definition of barriers (Workshop 1) and the transformation of policy to action plans (Workshop 2).

The Focus Group activity led to the presentation of a strategic road map based on 6 key Framework areas together with the definition of implementation measures, across a scale from local to intra-regional to inter-regional, together with the identification of potential barriers and examples of practice, to better inform strategic action.

It is noted that greater participation in regional warning systems results in lower costs, stronger and more sustainable systems of greater value for all regions and countries. 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 organizations.

Through improved regional cooperative mechanisms for MHEW, regions and countries can 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. In this regard, Higher Education Institutions are key-actors in developing capacity and developing scientific knowledge to improve regional cooperation and safeguard the livelihood of the communities and lives.

## ACKNOWLEDGEMENTS

The research work was conducted within the Framework of the CABARET Research Project (Capacity Building in Asia for Resilience EducaTion). The workshop activities were conducted in Kandy, Sri Lanka (March 2018), Yangon, Myanmar (September 2018), Manila, Philippines (March 2018); the authors would like to thanks the partner Universities hosting the meetings and the workshops. The authors would like to achnowledge the support of the project partners and the Work Package 5 workshop and Focus Group expert participants for their active contribution and for sharing their knowledge in MHEW.



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