

Integrating education with consumer behaviour relevant to energy efficiency and climate change at the Universities of Europe, Russia, Sri Lanka, and Bangladesh (BECK)



Research Degrees in Affiliated Research Centres Offered by: Global Disaster Resilience Centre, School of Applied Sciences, University of Huddersfield – United Kingdom Module Handbook – 2020-2021

Massive Open Online Course (MOOC) – PhD Module: Climate change and disaster risk reduction nexus



This handbook introduces the key information and the syllabus outline of the mentioned module.

This handbook has been prepared by the Global Disaster Resilience Centre (GDRC) in University of Huddersfield and BECK Centre under the EU Erasmus+ BECK Project.





Integrating education with consumer behaviour relevant to energy efficiency and climate change at the Universities of Russia, Sri Lanka, and Bangladesh (BECK)

BECK – PhD MOOC Modules



Development of New Adaptive MOOC modules on Consumer's Behaviour Related to Energy Efficiency and Climate Change

Description

The aim of the BECK project is to create a suitable basis for education in the field consumer's behaviour related to energy efficiency and climate change in the built environment (BECK) by introducing integrated, multidisciplinary BSc, MSc, and PhD adaptive, recognised, and certificated MOOC modules to existing study programmes in European, Russian, Sri Lanka and Bangladesh universities.

Accordingly, the Global Disaster Resilience Centre (GDRC) of University of Huddersfield as one of the project partners has developed the following PhD MOOC Module adhering to the themes and guidelines of the project.

Climate change and disaster risk reduction nexus (PhD Module)

The PhD programmes is available with the GDRC to be open accessed via online.

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1 Introduction

1.1 Integrating education with consumer behaviour relevant to energy efficiency and climate change at the Universities of Russia, Sri Lanka, and Bangladesh (BECK)

http://beck-erasmus.com/

Climate change is a result of modern human lifestyles and activities and leads to extreme weather events, such as storms, flooding, droughts, and heat waves. One of the possible solutions to these problems is the improvement of education on consumer behaviour related to energy efficiency and climate change. The main challenge is to consolidate a variety of diverse activities in education quality improvement, such as the delivery of extensive educational programmes and capacity building, the continued knowledge sharing, etc. To progress on these efforts, it is necessary to build the capacity and an associated network of experts and institutions.

Wider objective of the project is to upgrade the curricula with the 24 new harmonized study MOOC modules on consumer behaviour related to energy efficiency and climate change at the universities of Europe, Russia, Sri Lanka, and Bangladesh to increase their capacity to continually modernise, enhance the quality and relevance of education of students to the global labour market needs and to ensure international cooperation.

Main objectives of the BECK project:

- To upgrade curricula to improve their quality for BSc/specialists, MSc, and PhD students by adding 24 new, harmonized, and standardized study MOOC modules on consumer behavior related to energy efficiency and climate change (BECK) at the universities of Russia, Sri Lanka, and Bangladesh (PC universities henceforth), to enhance the quality and relevance of education in PC and EU universities to global issues.
- 2. To transfer European practices in education (learning and teaching tools, methodologies and pedagogical approaches including learning outcomes and ICT-based practices) from participating EU universities to PC universities.
- 3. To assist competence development of teachers within PC universities.
- 4. To develop the Simulated Big Data Interuniversity Networked Affective Educational Centre to encourage use of ICT-based methodologies in education and research.
- 5. To strengthen educational and scientific networking among EU and PC universities in the BECK field.

The project in general terms also will spread and promote the awareness in the Partner Countries related to the EU policies referred to Energy Efficiency and Climate Change approach towards EU best practices, with specific reference to the "Environmental & Energy 20-20-20 targets". The dissemination of the benefits of the curricular reform all over other HEIs will be performed as well.

GDRC, UoH according to the adopted Capacity Needs Assessment Methodology (CAPNAM) for Planning and Managing Education (United Nations 2013) has developed 2 PhD programmes under the climate change adaptation theme. The recognised and certificated MOOC module specifications and teaching materials are available for open access in the GDRC, UoH website.





2 Module Programmes and Qualifications

Doctor of Philosophy (PhD) (full or part-time)

2.1 Climate change and disaster risk reduction nexus (PhD MOOC Module)

2.1.1 Aim of the module:

To explore approaches in climate change adaptation to reduce disaster risk.

Disaster risk has come to be understood as a compound event, which lies at the intersection of hazards, exposure, and vulnerability of the exposed elements. As illustrated by climate and global environmental changes, the natural component of hazards is being transformed by anthropogenic activities, which are adversely changing the hazard susceptibility, coverage, frequency, and severity. The close connection between the trends of disaster risk and global environmental change has been identified as a critical milestone in climate change studies.

Climate change is understood to influence disaster risks in two ways, firstly through the incremental weather conditions and climate hazards, and secondly through the increased vulnerability of communities to natural hazards, particularly caused by ecosystem degradation, reductions in water and food availability, and changes to livelihoods. Climate change is yet another stress to human habitats found with environmental degradation and rapid unplanned urban growth, leading to a reduction in their abilities to cope with hazards and disaster risk.

This PhD programme on "Climate change and disaster risk reduction nexus" will discuss the cross-disciplinary intervention between disaster risk reduction and climate change adaptation.

Le	arning Outcomes of the course	Methods of studies	Assessment methods of student achievements	Assessment criteria of student achievements by assessment levels
1.	Demonstrate knowledge and understanding in different theoretical approaches, practical problems, and an appreciation of the diversity of polices at international and national levels, related to CCA and DRR.	Background study Literature review Refer to primary & secondary data sources	Supervision monitoring Proposal submission	Supervisor review. Recommend submit / submitting after revisions Recommend training & skill development programmes
2.	Demonstrate the ability to identify and formulate researchable issues with reference to the current risks assisted by the disaster risk reduction and future risks associated with climate change.	Literature synthesis Problem framing Formulating aims & objectives	Supervision monitoring Progress monitoring – 1 (Report & Viva)	Supervisor review. Recommend submit / submitting after revisions Examiner's review. Approve for the next stage Resub. of report Resub. of report & viva Transfer to M.Phil. Fail
3.	Demonstrate competence in scholarly analysis, case studies and synthesis to apply CCA strategies and DRR interventions in identified research areas.	Identification of. Research approach Research strategies Research choice	Supervision monitoring	Supervisor review. Recommend submit / submitting after revisions Recommend training & skill development programmes

2.1.2 Intended learning outcomes and assessment





4.	Evaluate the findings to design, conduct and communicate the approaches for CCA and DRR.	Research techniques for. Data collection Data analysis	Supervision monitoring Progress monitoring – 2 (Report & Viva)	Supervisor review. Recommend submit / submitting after revisions Examiner's review. Approve for the next stage Resub. of report Resub. of report Resub. of report & viva Transfer to M.Phil. Fail
5.	Provide solutions to complex problems / contribute original knowledge including academic and professional/transferable skills of disaster risk reduction and climate change adaptation, along with implications and limitations of research findings on this subject.	Methods of. Data collection Data analysis	Supervision monitoring Final report submission and viva	Supervisor review. Recommend submit / submitting after revisions Examiner's review: Accepted (Ph.D. offered / editorial changes / resub. minor changes up to 3 months / resub. major changes up to 6-12 months) Transfer to M.Phil./Fail

2.1.3 Syllabus outline

- 1. Disaster Risk Reduction (DRR) and the convergence agendas
- 2. Enablers and barriers for Climate Change Adaptation (CCA)
- 3. Governance in CCA and DRR
- 4. Accountability in CCA and DRR
- 5. Transfer of scientific knowledge into CCA and DRR policy formulation
- 6. Case studies
- 7. Reading materials

The module expects to explore knowledge in different theoretical approaches, practical problems, and an appreciation of the diversity of polices at international and national levels, related to CCA and DRR.

1. Disaster Risk Reduction (DRR) and the convergence agendas

Urban development faces a growing threat from the changing climate particularly through the impact of extreme climate 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 [1]. Even though there are significant initiatives on disaster risk reduction, these agendas have been evolving independently throughout the course and remains with a significant overlap between disaster risk reduction (DRR) and climate change adaptation [2]. DRR can play an essential part of climate change adaptation, hence is a first line defence against climate change. However, DRR needs to take account of the shifting risks associated with climate change to ensure that measures do not increase vulnerability to climate change in the medium to long-term [3]. Therefore, research into these aspects is required to study the integration of DRR and adaptation specifically the similar goals and conceptual overlaps, and mainstreaming frameworks for regular development planning. The focus of the studies about the DRR and CCA convergence agenda requires to pay attention on the policy coherence and effective use of resources, as continued separation results in administrative





inefficiencies, duplication of efforts and damaging competition between different inter-sectoral coordination mechanisms.



Figure 1: Illustration of the core concepts of SREX (Source: IPCC, 2012)

The Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX) (Figure 1) provides a summary of key findings for policymakers [4]. The SREX approaches the CCA by assessing the scientific literature on issues that range from the relationship between climate change and extreme weather and climate events ('climate extremes') to the implications of these events for society and sustainable development. The assessment concerns the interaction of climatic, environmental, and human factors that can lead to impacts and disasters, options for managing the risks posed by impacts and disasters, and the important role that non-climatic factors play in determining impacts.

It evaluates the influence of natural climate variability and anthropogenic climate change on climate extremes and other weather and climate events that can contribute to disasters, as well as the exposure and vulnerability of human society and natural ecosystems. It also considers the role of development in trends in exposure and vulnerability, implications for disaster risk, and interactions between disasters and development. The SREX report examines how disaster risk management and adaptation to climate change can reduce exposure and vulnerability to weather and climate events and thus reduce disaster risk, as well as increase resilience to the risks that cannot be eliminated. The report has identified the other important process, including the influence of development on greenhouse gas emissions and anthropogenic climate change, and the potential for mitigation of anthropogenic climate change.





I. Adaptation to climate change and disaster risk management

Adaptation to climate change and disaster risk management provide a range of complementary approaches for managing the risks of climate extremes and disasters. A wide range of complementary adaptation and disaster risk management approaches the can reduce the risks of climate extremes and disasters and increase resilience to remaining risks as they change

resilience to remaining risks as they change over time.

These approaches can be overlapping and can be pursued simultaneously. Measures that provide benefits under current climate and a range of future climate change scenarios, called low-regrets measures, are available starting points for addressing projected trends exposure, vulnerability, and in climate extremes. They have the potential to offer benefits now and lay the foundation for projected changes addressing (high agreement, medium evidence).

Disaster risk management is concerned with both disaster and disaster risk of differing levels and intensities. In other words, it is not



Figure 2: Adaptation and disaster risk management approaches for reducing and managing disaster risk in a changing climate, (Source: IPCC, 2012)

restricted to a 'manual' for the management of the risk or disasters associated with extreme events, but rather includes the conceptual framework that describes and anticipates intervention in the overall and diverse patterns, scales, and levels of interaction of exposure, hazard, and vulnerability that can lead to disaster (Figure 2). A major recent concern of disaster risk management has been that disasters are associated more and more with lesser-scale physical phenomena that are not extreme in a physical sense.

II. Conceptual and practical signs of convergence between DRR and CCA

Adaptation to climate change and disaster risk management both seek to reduce factors and modify environmental and human contexts that contribute to climate-related risk, thus supporting and promoting sustainability in social and economic development. The promotion of adequate preparedness for disaster is also a function of disaster risk management and adaptation to climate change. And, both practices are seen to involve learning, having a corrective and prospective component dealing with existing and projected future risk. However, the two practices have tended to follow independent paths of advance and development and have on many occasions employed different interpretations of concepts, methods, strategies, and institutional frameworks to achieve their ends. These differences should clearly be considered in the search for achieving greater synergy between both disciplines [5]. Some of the signs of convergence between DRR and CCA can be identified as below.

- Common ground being found in joint mainstreaming into development sectors, hence specialists on both CCA and DRR working in infrastructure, water, sanitation, agriculture, and health.
- DRR increasingly forward-looking and CCA increasing using and existing climate variability as the entry point for activating adaptation processes. The idea of 'no regrets' options is a key area of convergence.
- Disasters more often seen as linked to climate change, and governments recognizing the need to consider both simultaneously.
- Growing number of examples where local knowledge and meteorological/ climatological knowledge being considered side-by-side to inform DRR interventions.





DRR community demonstrating signs of being increasingly understood in engaging in climate change adaptation funding mechanisms.

2. Enablers and barriers for Climate Change Adaptation (CCA)

The next outcome of the module expects the student to demonstrate the ability to identify and formulate researchable issues with reference to the current risks assisted by the disaster risk reduction and future risks associated with climate change.

"Addressing the underlying risk drivers is key to both disaster risk reduction and climate change adaptation. [6]"

Considerable research issues can emerge in developing and implementing climate change adaptation strategies. Understanding the nature of issues to adaptation is important to find strategic solutions for DRR and CCA. Most of the research have highlighted that the current understanding regarding the DRR and convergence agenda is limited and highly fragmented across the academic community. Therefore, the practical barriers to climate change adaptation should be well identified and systematically assessed with indicators. These barriers and enablers emerge from the governance system or the system of concern identified as configurations of climate and non-climate factors. Mostly they are reported from the institutional and social dimensions of adaptation. Therefore, to ensure the accountability in CCA and DRR, the research should be more focused on comparative studies across different contexts led by empirical interventions. This module specifically encourages the student to research addressing the root cause of barriers to adaptation rather than confining to the 'if' and 'which' scenarios.

The acknowledgement of these differing perspectives should not be overestimated or considered as an inseparable obstacle toward a more holistic approach between the two sectors. On the contrary, it should help in identifying how and where synergies start and stop, and mutual benefits can be achieved. A full understanding of the specific shortcomings and differences between DRR and CCA identified so far, can help to explain why integrated "climate-smart disaster risk management" remains underdeveloped. According to the findings provided by the extensive literature on the topic, these can be grouped in seven key categories as mentioned below: [2].

١. Physical and temporal gaps

While DRR is commonly framed in a local dimension, being based on how a disaster is expected to affect a specific human community, climate change is a challenge that has historically been addressed at the global scale. Despite the localised effects of climate change having been increasingly considered, the way in which hazard patterns, vulnerabilities and risks are addressed and expected to evolve, is still often geographically unaligned between the global and the local.

11. Cultural gaps

A wide range of stakeholders (including scientists, NGOs, policymakers, the private sector, and educators) is potentially involved in any attempt to align CCA-DRR perspectives. Despite growing links between such professional disciplines, unharmonized expertise and different ways in which scientific knowledge, statistical data, traditional and local-indigenous knowledge, and technical information are collected, processed, and communicated have been detected as a barrier.

111. Institutional gaps

Divergences also relate to the way in which CCA and DRR activities are respectively framed by relevant bodies, both at the national and international level. In terms of global governance, the lack of systematic and longterm strategic planning for the integration of CCA and DRR knowledge and actions has been reported as an issue, and the two sectors are still coordinated and considered by different intergovernmental fora and





institutions. Consequently, different external financing systems for domestic action could also represent an element of fragmentation.

Based on the considerations drawing from the relevant academic and practitioner literature on how to achieve holistic management of climate-disaster risks (in other words "climate-smart disaster risk management"), an array of previously identified recommendations can be consolidated for the use of law and policymakers.

IV. Cross-sectoral coordination and governance

Stimulating national coordination between different ministries, agencies and platforms respectively engaged in CCA and DRR activities is widely recognised in the literature as one of the key methods for the accomplishment of effective and context-specific coherence. Stronger and more stable inter-institutional links can result from comprehensive legislative frameworks and policies that set the stage for joint responsibilities and cross-cutting administrative procedures. Such inter-institutional links should also consider the overall amelioration of the economic conditions of the society (poverty reduction and development goals) as set out in the SDGs and the related global indicator framework. Therefore, institutions responsible for budget allocation (e.g., ministry of finance and/or economic development) should be directly part of this mainstreaming effort.

V. Implementation strategies

Broadly speaking, CCA and DDR practices and objectives should be combined by means of the adoption of converging policies aimed at reducing gaps between their temporal and spatial scales. DRR assessments and implementation strategies should consider near-term climate change scenarios and enable conditions for transformative adaptation that benefit those most at risk and most in need.13 Contextually, more aligned timeframes should be supported by norms and policies allowing the actors that promote vulnerability and risk reduction through the lens of CCA to obtain sufficient and stable access to long-term funding and implementation periods.

VI. Funding

Monetary resources for integrated strategies could come from public budgets, international actors (multilateral and regional funds) or private donors. According to some authors, these different sources should be consistently combined, through the involvement of ministries with responsibilities for managing public finances, thus permitting an effective cost/benefit analysis and a flexible allocation to both specific activities and more long-term strategies. In particular, the protection of the poorest and most vulnerable in society could be strengthened through the adoption of appropriate social protection systems and contributory schemes for the diversification and reduction of the risks.

VII. Information management

Governmental decision-making and related normative frameworks should be based on an adequate understanding of exposure, vulnerability, and resilience, especially considering their continuously shifting dimensions. This result should be attained through the development of more aligned monitoring processes, information management systems, and updating mechanisms which should be relevant and enable/ target a diversity of stakeholders. It has been suggested that a major improvement in information management could be achieved through greater access and exchange between different data sets and models, including free access and unimpeded uses through web-portals.

3. Governance in CCA and DRR

The researchable issues discovered in the literature and background studies shall be used to demonstrate competence in scholarly analysis, case studies and synthesis for identifying the appropriate CCA strategies and DRR initiatives in the identified case study. Evaluating these findings is expected to incorporate in the PHD





research to transfer scientific knowledge into the nexus of CCA and DRR and provide solutions to complex problems in the identified areas.

I. Disaster risk governance to manage disaster risk

"From management to governance" is an often-used dictum and is embodied in priority two of the Sendai Framework, "Strengthening disaster risk governance to manage disaster risk" [7]. The presumption of these guidelines is that governance is central to a 21st century form of DRM. This is increasingly becoming clear as the field of actors in DRM is expanding and becoming more complex, and as the private sector and civil society will play larger roles in the future, not least because of the focus on resilience. Disaster risk governance means

using governance measures to support disaster risk management and risk reduction activities.

The SHIELD model developed by the ESPREssO team demonstrates a comprehensive set of guidelines (Figure 3). This model encompasses a set of general recommendations for how to optimize risk management capabilities through disaster risk governance. As illustrated, the six domains in the model revolve around the four traditional DRM phases, highlighting how practices involved in response, recovery, prevention, and preparedness are themselves dependent upon a range of institutions, policies, and structures. The model thus illustrates interlinkages the and interdependencies between management and governance in DRR and CCA [8]. Each phase of the model contains several identified key issues, and a series of recommendations.



a. Sharing knowledge

Figure 3: The SHIELD model revolving around the four disaster management phases, (Source: ESPREssO, 2018)

Today, any effective DRM and DRR efforts

depend heavily on different sources of knowledge. Accordingly, effective actions depend on the ability of institutions, organizations, and agencies in the public as well as the private domains to share knowledge and information, which can take the form of anything from forecast model outputs, risk assessments, policy analyses, to local knowledge of past events.

b. Harmonizing capacities

A high-performing disaster risk governance system requires specialised capacities; however, this is not only in terms of tools or equipment. People are the main capacity within any governance system, and it is their expertise, experience, and local knowledge that are just as important as, and often more so, than the physical and technological assets (e.g., pumps, fire trucks or the latest technology). Accordingly, identifying and ensuring the necessary expertise, equipment, and other forms of capacities within public institutions is crucial for implementing disaster risk governance.

c. Institutionalizing coordination

In evaluations after disasters, what is often highlighted is how communication and coordination between stakeholders failed. Disasters challenge the ordinary institutional set-up and require new kinds of cooperation and coordination. Accordingly, there is no such thing as a predefined, perfect set-up for coordination in





disaster situations. Nonetheless, as recent reports, research publications and international frameworks highlight, coordination is such a central aspect of DRR, that improving and prioritizing it might also contribute to solving other problems, such as ensuring stakeholder inclusion or raising public risk awareness.

d. Engaging stakeholders

Today, the traditional command and control approach does not hold a monopoly in the way disasters are managed but is complemented by a host of supporting bottom-up initiatives and multi-stakeholder forums. Calls for resilient societies and adaptive communities signal a desire and a need for the mobilization of all kinds of actors in society to govern disaster risks. Governments, private sector, NGOs, grassroots organizations, local associations, interest groups and individual citizens all have a stake in how we deal with individual disastrous events and the effects of a changing climate.

e. Leveraging investments

Investing in DRM and DRR will help to reduce costs for response and recovery in the long term. A key message from international organizations like the United Nations. and the World Bank. is that governments should acknowledge that a sensible and cost-effective way to deal with disasters is by using financial investments aimed at not only prevention, but also at building resilience, for instance through microfinancing. Although the cost benefit ratios of DRR measures are hard to determine with a high level of precision, studies have found that effective risk reduction investments can reduce the economic losses following disasters as well as shifts in investment strategies that can benefit the economy of a country, region, city, or town even before the disaster has struck.

f. Developing communication

For some time now, we have been living in what sociologist Manuel Castells called the Information Society. That is, the world depends much more upon the exchange and use of information. This change from the industrial society to the information society has had huge political, economic, and cultural consequences. Politically and economically, we now speak of the knowledge society, replacing the industrial epoch, whereby knowledge is the main driver of growth and prosperity, not ploughs or steam engines.

II. Key recommendations to optimize risk management capabilities through disaster risk governance

a. Bridge knowledge gaps between science and policy

Identifying partners who could enable knowledge sharing between the science and policy domains should be a high priority, as input from scientific experts are vital in relation to questions such as risk assessments and raising public risk awareness.

b. Match capacities to risks

Capacities also need to be weighed against existing hazard, vulnerability, and risk assessments. Harmonizing capacities in this sense is not a question of spreading out capacities in equal measures across a country, but to link those capacities to the hazard, vulnerability, and risk profiles that each region or municipality faces.

c. Acknowledge the need for balance and flexibility

Disaster coordination is not necessarily solved through stronger formal hierarchies. There is a difference between formal coordination and actual coordination that may include informal or ad hoc relationships.

d. Build partnerships for transboundary crisis management

Coordination across borders is crucial. While the transboundary element has received substantial regulatory attention in recent years, not least with the adoption of the EU Civil Protection Mechanism (UCPM), actual coordination is still an issue.





e. Utilize local stakeholder knowledge for DRR actions

Stakeholder engagement and inclusion should also yield concrete outputs that optimize and enhance DRR efforts. Governments at the national and subnational levels can benefit greatly from cooperating with local stakeholders on several key activities, such as incorporating local knowledge of risks and vulnerabilities into risk management policies.

f. Make long-term political agreements

Disasters and climate change are issues that are much too important to be affected by political cycles and momentary populist agendas. A political system that does not include the commitments required to confront climate change and disaster prevention over the long run is doomed to fail.

g. Strengthen and streamline early warning platforms

With the advent of smartphones and social media, warnings and crises updates are potentially enhanced, and many governments and emergency managers have already used these new platforms and technologies effectively. However, given this capacity also comes the risk of warnings being duplicated and/or misinterpreted if spread on social media networks.

III. Opportunities for building resilience

Disaster risk governance at the global, regional, national, and subnational levels is of great importance for the effective and efficient management of disaster risks. Clear strategies in national government, the focal point representing the national level, are needed, including a clear vision and mission, plans, competence, guidance, and coordination within and across sectors [9]. It also requires the participation of relevant stakeholders, together with strengthening disaster risk governance, disaster response, rehabilitation, and reconstruction. National governments need to facilitate collaboration and partnership across mechanisms and institutions for the implementation of instruments relevant to DRR and resilience building.

As it links to almost every other risk driver, addressing weak risk governance is fundamental to addressing the other underlying drivers of risk. Wealthier, better governed city regions are likely, over time, to successfully manage the processes that generate extensive risk. At the same time, it stressed the importance of integrating disaster risk reduction into development policies, including poverty reduction, based on strong political determination [10]. Central governments need to anchor responsibility for disaster risk management in a ministry or office with adequate political authority to ensure policy coherence across development sectors. Community-driven development programs have also provided effective disaster response and recovery support, and often evolve disaster risk reduction from a reactive to a more proactive risk management approach [11]. Risk governance structures and policies need to be expanded to include real consideration of the business sector and civil society. The future of effectively integrated disaster risk reduction in national policies and planning will depend on governments and political leaders becoming more successful at combining the promotion of local and national economic growth with effective disaster risk management.

Countries will continue to require a dedicated and specialized disaster management sector to prepare for and respond to disasters [12]. However, disaster and climate risks in development need to be approached through strengthened governance arrangements in sectors and territories. This strengthening requires a combination of disaster risk management activities that avoid the creation of new risks in investments - which remains a challenge for most along with the reduction of existing risks, and efforts to strengthen resilience at all levels.

Incremental decentralisation accompanied by clear mandates, budgets, and systems of subsidiarity, promotes ownership and improved risk governance at all levels. Local planning, financing and investment that build on civil society partnerships can enable the scaling up of community initiatives. Improved accountability mechanisms grounded in legislation and work processes, social audit processes, and a free press and active media contribute to improving the awareness of rights and obligations on all sides.





4. Accountability in CCA and DRR

I. Accountability in disaster risk governance

Accountability in disaster risk governance is a cross-cutting and complex governance issue for which each state has the primary responsibility to ensure that the public are safe and aware of risks, and to prevent and reduce disaster risks [13]. This includes through international, regional, sub regional, transboundary, and bilateral cooperation. This also requires political and legal commitment, public understanding, scientific knowledge, careful development planning, responsible enforcement of policies and legislation, national risk assessment, disaster loss data, people-centred early warning systems, and effective disaster preparedness and response mechanisms. This guide will play a key role in promoting the subject and indeed, it may help national governments to implement capacity building around it. It seeks to provide and mobilise knowledge, skills and resources required for promoting accountability as a key enabler of disaster risk governance.

These aspects of good governance are key factors that can largely determine the extent to which DRR may be achieved, both nationally and globally. Accountability can be viewed as an entry point to establishing more effective disaster risk governance. However, accountability should not be viewed in isolation; these aspects of good governance are complementary and often reinforce each other. In other words, accountability can be established and strengthened only within a comprehensive good governance framework [14].

II. Accountability in the Sendai Framework for Disaster Risk Reduction 2015-2030

The Sendai Framework for Disaster Risk Reduction (SFDRR) has a broader and a more people-centred, preventative approach to disaster risk. It builds on the understanding that DRR practices need to be multihazard and multi sectoral, inclusive, and accessible to be efficient and effective. It also calls for coherence and coordination across international agendas.

The SFDRR set outs seven global targets:

- Substantially reduce global disaster mortality
- Substantially reduce the number of affected people
- Reduce direct disaster economic loss
- Substantially reduce disaster damage to critical infrastructure and disruption of basic services
- Substantially increase the number of countries with national and local disaster risk reduction strategy
- Substantially enhance international cooperation to developing countries
- Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people

"Accountability of leaders, governments and institutions has become critically important to ensure that they anticipate disaster risks and plan and implement appropriate polices, introduce enabling legislation where there are gaps, and carry out interventions to reduce risks and minimize various losses [14]."

SFDRR emphasises that DRR and management depend on coordination mechanisms within and across sectors, and with relevant stakeholders at all levels. It requires the full engagement of all State institutions of an executive and legislative nature at national and local levels. It also necessitates a clear articulation of responsibilities across public and private stakeholders, including business and academia, to ensure mutual outreach, partnership, complementarity in roles, and accountability and follow-up.





III. Innovative elements of accountability

Table 1: Innovative elements of accountability (Source: UNDRR, 2019)

	Given the increasing significance of DRR today, accountability needs to be defined in
Broadly defined	broader rather than narrower terms to ensure that state and non-state actors live up
	to public expectations with regard to vulnerability reduction and preparedness
	improvement at all stages of disaster management.
Long term process	DRR is a long-term process covering pre-, during and post disaster situations. Effective
Long term process	accountability must also be present in all three periods.
	It is important to identify the institutions and authorities that can be held accountable.
Responsibility	This also needs to be carefully examined to apportion responsibility, including to
Responsionity	establish a clear understanding of the state's legal and moral obligations, and capacity
	to deliver all components of Sendai Framework.
	Accountability for DRR is an obligation on the part of many stakeholders from national
	government downwards. These include state institutions, business organisations,
Stakeholders	various professional groups, local government, media institutions and civil society
	organisations. Availability and accessibility of data and timely information can create an
	enabling environment to promote accountability on the part of many actors.
	Given the diversity of potential actors and institutions involved in DRR,
	accountability is often a joint responsibility. In the case of slow onset disasters like sea
	level rise and pollution, scientific data can be critical for planning but sharing of such
	information is not common. Collaboration between actors, including effective
Collaboration	communication mechanisms, is vital.
	An accountability systems approach emphasises the need to move beyond a narrow
	focus on supply-side versus demand-side accountability support, or a focus only on
	formal institutions, and instead to look more closely at the linkages among actors and
	how these can be strengthened over time.
	The lack of accountability on the part of governments, state institutions and
	public officials, as well as diverse private sector stakeholders, tends to magnify the
	material and human costs of disasters. While it is necessary to find effective ways to
Develtion and incentions	ensure accountability, these may include both penalties as well as incentives.
Penalties and incentives	Accountability is not about pinning responsibility on one centralized body like a
	national disaster management agency but enlisting multiple actors to take
	responsibility, both individually and collectively. It is important to ensure that their
	failure to do so is not inconsequential, in terms of both penalties and rewards.
	The role of regulatory bodies, those relating to coastal resources, human settlement,
De sulate su la sulta s	construction, and social and physical infrastructure, is critically important to ensure
Regulatory bodies	accountability on the part of many stakeholders such as land developers, industrialists,
	construction firms and state institutions.
	While large-scale disasters such as tsunamis and earthquakes usually draw responses
	from institutions across a wider field, most of them naturally withdraw from the
External actors	disaster zone over time, leaving behind newly built settlements, vital infrastructure,
	and other arrangements, but also their responsibilities. The upkeep and maintenance
	of these often become the responsibility of national and local government institutions.
	It is important to identify the characteristics of the community and
.	characteristics of the enabling environment, including how to encourage
Broad participation	broad-based participation, strengthening the political involvement of citizens in
	decision-making processes, and in mechanisms for legitimacy and control.



	There is also a need to strengthen downward accountability by supporting feedback
	channels from the community and civil society to sub-national and even national
	government to articulate local needs and preferences.
	There is a need to support citizens, particularly those most vulnerable to disasters, to
	understand relevant rights, policies, and possible accountability pathways. This
	includes citizen involvement in monitoring DRR progress based on locally conceived
	priorities at every scale, including policy formulation and implementation.
	Monitoring processes are critically important. This includes the need to provide a
Monitoring	basket of indicators, providing clarity on the 'nuts and bolts' of monitoring, focusing on
women	data management, improving systems to track and gauge disaster risk, and ensuring an
	alignment with the monitoring systems of the Sendai Framework.

IV. Implementing accountability

Revamping the existing governance structures to cope with the challenges of effective DRR could potentially involve a comprehensive review of the prevailing development and other policies, laws, rules, and regulations. What is outlined below are key steps that governments need to take to ensure their accountability for DRR [14].

a. Mainstreaming DRR into overall national policies

It is an imperative to mainstream DRR into national development and other policies, and to demand governments to play a clear and leading regulatory and coordination role. Development and other relevant sectoral policies of the State need to contribute to DRR. In many cases, existing policies might have to be reviewed to ensure that State policies do not obstruct the achievement of national and global DRR targets.

b. Enabling legislation

Beside State policies, a comprehensive review of existing legislation in relevant areas might be necessary to determine legal obstacles to DRR. Such a review is more than likely to indicate the type of new enabling legislation required to facilitate DRR.

c. Institutional development

Given the enhanced regulatory and coordination role of the State in the new DRR framework, the development of the necessary institutional infrastructure is a critical step in ensuring that governments and other accountability holders live up to public expectations with respect to DRR. It is important to clearly define each institution's responsibility and how and when each institution should connect to each other. It is also important to emphasise the legislative enactments and action plans to hold to account the institutions exposed to litigations.

d. Adequate resources

The implementation of a comprehensive DRR strategy would require unprecedented mobilisation of human, technical and financial resources. Given the resource and other constraints that many countries face, meeting this challenge would require careful thinking and planning. While reallocation of public finances in favour of DRR might help overcome some of the resource limitations, other strategies such as mobilisation of resources through partnerships can also be effective. Avoiding duplication of function and promoting resource sharing among institutions can be effective ways to overcome some of the resource constraints.

e. Empowerment of stakeholders

Complexity and the wide-ranging nature of disaster risks make it an imperative that governments promote effective coordination across diverse actors, both vertically and horizontally. But coordination is of limited value unless other stakeholders are empowered and given opportunities to play an active and responsible role





in DRR. While enabling legislation can define the lines of authority and distinct responsibilities of different sectors and levels of government, allocation of required resources to different authorities with clear responsibilities is necessary to ensure timely actions. The importance of academic contributions through multidisciplinary research should be emphasised, together with stakeholder consultations at various levels such as government, non-government organisations, academics, community, and other local level officials.

f. Regular monitoring, evaluation, and review

Given the diversity of actors and actions involved in DRR (e.g., political leaders, Ministries, national institutions, sub-national and local authorities, private sector, professional groups, civil society organisations), regular monitoring, evaluation, and review of DRR processes and outcomes is critically important. This should be part of an overall continuous improvement process. The assignment of this overall responsibility to a national body with the necessary resources and capabilities is important. This requires a clear demarcation of responsibilities with respect to generation and transmission of information in an efficient and timely fashion.

5. Transfer of scientific knowledge into CCA and DRR policy formulation

Within the discipline of DRR, including CCA, significant thematic research focus has been raised to the application of research knowledge in policy and practice. Further, the researchers also have resulted in many recommendations on the use of information and knowledge for the advancement in the field of knowledge development, means of transmission, and use for disaster risk reduction [15]. However, a significant fragmentation in the knowledge at different phases has been identified in the disaster management continuum which requires to be addressed in a complete manner to strengthen both individual and institutional learning, as well as to determine social and functional changes required to address pressing issues of disaster risk reduction, including climate change adaptation.

I. CCA and DRR commonalities and differences

As DRR and CCA involve a range of very diverse actors, different stakeholders define DRR and CCA concepts as per their scope of knowledge and objectives. This has created many diverse terminologies, such as the understanding of risk, impact, vulnerability, and resilience. About 60 % of the terms currently used in the CCA and DRR/DRM (Disaster Risk Management) communities overlap (Figure 4). Although they are used in both fields, they can have quite different meanings (lack of common terminology), depending on the context and person involved, and might result in numerous misunderstandings. Beyond lacking a shared understanding of key terminology, a major challenge is the competition for scarce resources to be implemented by different stakeholders for the same or similar objectives [16].





Co-funded by the **Erasmus+ Programme** of the European Union



Climatic hazards: Storms / floods / landslides / temperature extremes / droughts / fires / rising sea levels / avalanches / climate change following volcanic eruptions

 \mathbf{v}

Impacts of climate hazards: Population shifts / international conflict / impacts on health services, agriculture and fisheries, economies on human settlements / institutional adaptation

Joint DRM & CCA programmes to create resilience

Non-disaster aspects of CCA: (including the positive benefits from climate change)

CCA

Risk assessment

Wider aspects of adapation: litical / social / economic / environmental

Low levels of certainty

High political commitment

Short history (since about 1985)

Figure 4: Terms and meanings in CCA and DRR/DRM: commonalities and differences (Source: PLACARD project, 2018)

'Uncertainty' denotes a cognitive state of incomplete knowledge that results from a lack of information and / or from disagreement about what is known or even knowable. It has many sources ranging from quantifiable errors in the data to ambiguously defined concepts or terminology to uncertain projections of human behaviour. 'Risk' refers to the potential for adverse effects on lives, livelihoods, health status, economic, social, and cultural assets, services (including environmental), and infrastructure due to uncertain states of the world [17]. To the extent that there is a detailed understanding of the characteristics of a specific event, experts will normally agree regarding estimates of the likelihood of its occurrence and its resulting consequences.

Developing robust policy response strategies 11.

There is a growing recognition that today's policy choices are highly sensitive to uncertainties and risk associated with the climate system and the actions of other decision makers. The choice of climate policies can thus be viewed as an exercise in risk management [18]. A large empirical literature has revealed that individuals, small groups, and organizations often do not make decisions in the analytic or rational way envisioned by normative models of choice in the economics and management science literature. People frequently perceive risk in ways that differ from expert judgments, posing challenges for risk communication and response. There is a tendency to focus on short time horizons, utilize simple heuristics in choosing between alternatives, and selectively attend to subsets of goals and objectives. To illustrate, the voting public in some countries may have a wait and see attitude toward climate change, leading their governments to postpone mitigation measures designed to meet specified climate targets.

Developing robust policy response strategies and instruments should consider how the relevant stakeholders perceive risk and their behavioural responses to uncertain information and data (descriptive analysis). The policy design process also needs to consider the methodologies and decision aids for systematically addressing issues of risk and uncertainty (normative analysis) that suggest strategies for improving outcomes at the individual and societal level (prescriptive analysis) (Figure 5).







Figure 5: Framework for climate risk management (Source: IPCC, 2014)

III. Learning, unlearning, and innovating in DRR in integration to CCA

Knowledge management systems prove to work if individuals and organizations are able not only to share and maintain relevant information and knowledge but also to acquire new knowledge by learning and innovating. However not just learning about facts and new methods or tools are of use for organizations, but also, regarding how things are done within the organizations and in concert with others. In particular, the management of prevention strategies and of crises requires significant learning about how things are done or could be done better [19]. When talking about learning and innovating in the field of disaster risk management, the possibility of unlearning, or forgetting must be kept in mind. Many times, what is presented as real novelty is in fact re-discovery of concepts and tools that were already at hand in the past. This occurs also because of the fragmentation of knowledge mentioned above. Notions like "resilience" for example are not new even though sometimes considered such in recent debates on disaster risk. Referring to innovation what is meant is often the introduction of new tools and of new technologies.

The same idea of knowledge management systems in the form of platform to facilitate access to and sharing of relevant pieces of knowledge is made possible by the significant changes the new media, the cloud computing and storage facilities offer. A more dynamic perspective of how knowledge is produced, shared, and eventually coproduced, requires abandoning the idea of "knowledge transfer", but rather to enhance the cooperation and the coordination capacity among different stakeholders and social groups, particularly when they are working in the same geographical context on the same problems.

Finally, as suggested by various authors [19], innovation is pursued by changing organizational procedures and processes. However, a couple of points deserve further discussion. The first is the need to balance innovation with stability: innovation can take place only against practices and procedures that are kept stable in the fore or in the background and in the meantime enough time needs to be allocated for verifying the results of





introduced changes. In this respect, it must be reminded that significant changes in organizations will take at least a decade to become apparent and provide results, whist often issues are brought to the front line in much shorter time, that is measurable by years if not less.

IV. From risk information to risk knowledge

Risk awareness and knowledge must be expanded and enhanced. To this end, the social production of risk information must be transformed, and the provision of information must be turned into a social process of producing risk knowledge [20]. A first step towards the enhanced management of disaster risk is through greater risk awareness and knowledge. The social production of risk information itself needs to be transformed, with a shift in focus from the production of risk information per se towards information that is understandable and actionable for different kinds of users: in other words, risk knowledge. This transition will require change in the way risk data and information are currently produced and transformed. On the one hand, it will require governments to invest in the collection, management, and dissemination of risk information, including disaster loss and impact statistics, hazard models, exposure databases and vulnerability information.

An increasing sensitivity to extensive risk is crucial to strengthening overall risk awareness. Because of its pervasiveness in time and space, extensive risk relates directly to the day-to-day concerns of households, communities, small businesses, and local governments and can therefore stimulate and leverage social demand for disaster risk management. Extensive disasters provide real-time and locally specific indicators of how risk is generated inside poverty in everyday life. As a result, disasters of this sort provide a window to understand risk in the here and now, rather than in an abstract future.

This perspective also has implications for current efforts to boost public awareness, education, and risk information, which tend to reflect and reinforce the orthodox conception of disasters as external threats to development. Rather than revealing opportunities or empowering actions to change development practices, these efforts dissimulate the drivers that generate and accumulate risk in the first place. Shifting the emphasis from awareness of disasters as external events towards the process of risk generation and accumulation in development is therefore critical.

- 6. Case studies
- Challenges associated with integrating CCA and DRR in the UK- A review on the existing legal and policy background [21]
- A micro scale study of climate change adaptation and disaster risk reduction in coastal urban strategic planning for the Jakarta [22]
- Climate Change Risk Research: A Case Study on Flood Disaster Risk in China [23]
- Adaptation actions for integrated climate risk management into urban planning: a new framework from urban typologies to build resilience capacity in Santos [24]
- Challenges associated with integrating global policies on DRR and CCA in urban development: Asian perspective [21]
- A Resilient Environment through The Integration of CCA and DRR: An Overview of Existing Challenges [25]
- Integrating climate change adaptation and climate-related disaster risk-reduction policy in developing countries: A case study in the Philippines [26]
- Barriers and enablers to climate change adaptation in hierarchical governance systems: the case of Vietnam [27]





 Integration of CCA and DRR for Flood Resilience: A review of good practices in the United Kingdom [28]

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