



EFDRR
EUROPEAN FORUM
FOR DISASTER RISK REDUCTION

European Forum for Disaster risk reduction (EFDRR)

HOW DOES EUROPE LINK DRR AND CCA?

WORKING PAPER

Working Group on Climate Change Adaptation and Disaster Risk Reduction



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List of abbreviations

AFPCN	'Association Française pour la Prévention des Catastrophes Naturelles (French association for natural disaster prevention)
CCA	Climate Change Adaptation
CofE	Council of Europe
DG	Directorate General
DKKV	Deutsches Komitee für Katastrophenvorsorge (German Committee for disaster risk reduction)
DRR	Disaster Risk Reduction
DSB	Direktoratet for samfunnssikkerhet og beredskap (Norwegian Directorate for Civil Protection)
EC	European Commission
EEA	European Environmental Agency
EFDRR	European Forum for Disaster Risk Reduction
EU	European Union
EUR-OPA	European and Mediterranean Major Hazards Agreement
HFA	Hyogo Framework for Action
UNISDR	United Nations Office for Disaster Risk Reduction
UNU	ons University
WG	Working Group

Introduction

Since its creation in November 2010, the European Forum for Disaster Risk Reduction (EFDRR) has considered Climate Change Adaptation (CCA) to be one of the most prominent challenges for developing safe and resilient communities at local, national, regional and global scale.

As a consequence, a Working Group on CCA and Disaster Risk Reduction (DRR) under the EFDRR was established in 2011 following the first session of the EFDRR in Sweden (06 - 08 October 2010). Its objective is to contribute to the EFDRR agenda with the production of knowledge and information sharing on the topic of CCA and DRR linkages and which are the institutional and legal mechanisms that in the European context support the integration of those two areas of operation.

In 2012, the Working Group on CCA and DRR carried out a survey among European countries on disaster risk reduction (DRR) and climate change adaptation (CCA). The aim was to get an overview to which extent, and how, member countries of the EFDRR link these two issues.

The survey was sent to HFA focal points and National Platform coordinators in 43 countries. Out of these, 20 countries completed the survey fully and 4 only provided partial information. The initial findings of the survey were presented at the 3rd Annual Meeting of the EFDRR in Dubrovnik, Croatia, October 2012, and the discussion confirmed the interest of the participants to go beyond a simple survey.

This report examines key findings of the survey, and provides the basis for policy discussions and suggestions to the EFDRR towards its work on climate change adaptation. Furthermore, it provides relevant scientific background information to be taken in consideration by practitioners when implementing DRR and CCA projects, Dr. Joern Birkmann, (United Nations University, Bonn), describes the challenges to DRR and CCA interaction based on the present gaps between both approaches. The report shows that, in spite of those gaps, strong links have already been established in many countries not only as principles in policy development but also in actual implementation of DRR efforts at various levels. That convergence is in particular illustrated through examples from Poland, Norway and France on how to link in practical terms efforts in DRR with CCA, a need that is highlighted by the EU Adaption Strategy, adopted by the European Commission on April 2013.

Recognizing that implementation on the ground is the key to strengthen resilience in Europe, EFDRR will thus make use of the present report to promote stronger links between CCA and DRR not only through integration of CCA components in regional and national strategies for disaster risk reduction but also through integration of DRR measures into climate change adaptation strategies. EFDRR will thus continue its work to strengthen that convergence throughout Europe, notably based on shared experiences from its member countries.

Last but not least, the report hopes to also be considered as a contribution to the post 2015 of Hyogo Framework for Action (HFA2) on-going discussions and as useful background information for other regional or global initiatives on linking disaster risk reduction and climate change adaptation.

On behalf of the European Forum for Disaster Risk Reduction,

Dag Olav Høgvold,
DSB Senior Advisor
Chair, EFDRR

Axel Rottländer,
DKKV Chief Executive Officer
Chair, Working Group on CCA and DRR

“Reducing disaster risk must be part and parcel of any climate change adaptation plan and strategy. It’s the only hope we can have of making a real impact on the future of sustainable development for people worldwide – not just vulnerable communities but also for entire nations.”

**Kristalina Georgieva, EU
Commissioner for International
Cooperation, Humanitarian
Aid and Crisis
Response**

“Cutting the world’s greenhouse gases must remain our top priority in order to keep warming below 2°C and avert dangerous climate change. But the adverse impacts of the changing climate are increasingly evident today in Europe. Disaster risk reduction and climate change adaptation are one of the most fundamental challenges for territorial development in Europe”

**Connie Hedegaard, EU
Commissioner for Climate
Action**

The European Forum for Disaster Risk Reduction (EFDRR) Working Group (WG) on Climate Change Adaptation and Disaster Risk Reduction is currently (2013) composed by Germany (Chair, Axel Rottländer, CEO, DKKV), France (Philippe Boullé, Board Member, AFPCN, Alice Azémar, International Affairs Representative, AFPCN), Norway (Dag Olav Hogvold, Senior Adviser, DSB) and Poland (Tomasz Walczykiewicz, Chief of Division, IMGW).

The following international organizations contribute to the WG work: UNISDR (Demetrio Innocenti, Programme Officer, Stefanie Dannenmann-Di Palma, Programme Officer), EC (Sami Zeidan, DG Climate Action, Legal Officer) and Council of Europe (Francesc Pla, EUR-OPA Deputy Executive Secretary).

Major challenges and gaps between DRR and CCA

In vision of the post-Hyogo Framework for Action (HFA) blueprint which will internationally coordinate efforts in building climate and disaster resilience, it is most important that mechanisms such as the Regional and National Platforms for Disaster Risk Reduction address the need of mainstreaming Disaster Risk Reduction (DRR) in Climate Change Adaptation (CCA) strategies.

The work of the European Forum for Disaster Risk Reduction (EFDRR), through its Working Group (WG) on CCA and DRR, is relevant as it stimulated further research on how much European countries consider DRR as a pillar for good governance of climate adaptation. The survey carried out by the EFDRR WG in 2012, whose outcomes are presented in this working document, provides an overall understanding that the situation in Europe is jeopardized and that there is a need to further investigate this subject to improve the governance of climate and disaster risk.

Understanding of differing spatial, temporal and functional scales is critically important to address the links between CCA and DRR and develop appropriate strategies to reduce disaster risk and adapt to climate change.

A major challenge is the mismatches at the spatial scale since climate change issues have primarily been analysed on a global scale – even though downscaling approaches receive increasing attention - whereas disasters have been studied in the respective regions and localities where they occur (meso- or local/micro-scale). Climate scientists have mostly designed global models and predicted global trends based on universal laws, whereas the disaster risk reduction community looks often at local vulnerabilities and risks in specific areas, including groups of people potentially or actually affected.

Linking CCA and DRR more effectively requires further improvements in the exchange and combination of different spatial scales on which the two communities primarily focus and act. This requires in the first place an improved integration at local level of adaptation plans with risk reduction measures and harmonization with national adaptation strategies, and, in the case of the European Union (EU), with the overall EU CCA strategy, which is showcased in this working paper.

Temporal scale challenges are another issue to be addressed. Disaster risk management measures are often conceived on the basis of addressing existing risks rather than long term approach. In contrast, climate change adaptation strategies are (or should be) characterized by long-term perspectives that might also require the long-term presence of respective stakeholders in countries at high risk. Thus, the establishment of a longer assistance timeframe and the development of supportive and enduring institutional structures that could effectively link disaster risk reduction and climate change adaptation, for example in the aftermath of a crisis or disaster, are often not envisaged by the requesting country.

Knowledge mismatches

Within the general sphere of knowledge important barriers and constraints can also be identified. One of the core challenges in this context is the competition between different types and sources of knowledge and the weak links between different types of data and work applied by climate and risk scientists and practitioners, which hinders straightforward communication, collaboration and joint programming across larger governance networks. The failure to effectively communicate scientifically acquired knowledge about climate change in a practical way and the lack of substantial guidance on how to deal with uncertainty provide major challenges for practitioners.

Furthermore, some important information is not yet available. For example, social and economic census data in addition to data on governance issues, especially in dynamic areas with high fluctuations of people and economic as well as political instability, would be essential in order to assess changing vulnerabilities and develop appropriate adaptation strategies. However, appropriate methodologies to detect such changes and transformations as well as the data bases are not sufficiently developed yet. The development of scenarios for vulnerability at different scales might be a promising first approach to better account for potential dynamics in socio-economic conditions and in societal vulnerability.

Locally held knowledge also reveals much about the capacities of local societies that might be difficult to assess from the outside. In other cases local knowledge might also be marginalized by so-called technical experts in policy processes. Local knowledge needs to be valued and considered in DRR and CCA, however, it might often be based on experiences of the past and hence may be insufficient for addressing new challenges or new hazards linked to climate change.

Overall, the systematic consideration of different knowledge types is important and a pre-requisite for inclusive adaptation and risk reduction strategies.

While linking CCA and DRR concepts and strategies, it is important to utilise the synergies between both communities and approaches resulting in more effective disaster risk management in the context of climate change. However, as the IPCC Special Report SREX points out, this can only be achieved by an appropriate framing of the problem that takes into account the wider implications of climatic changes, particularly of climate variability and anthropogenic climate change, and their impacts on certain hazards and environmental stressors. This needs to be done from the outset.

In addition, adaptation and risk reduction strategies must be grounded on sound data tied to the vulnerability and exposure of societies, communities and social-ecological systems. In this context vulnerability and exposure also have to be viewed and understood within the broader context of development processes and interactions between disaster risk management and climate change adaptation. Consequently, linking DRR and CCA depends on the acknowledgement of the importance

of climate change and societal changes and the interactions between the two.

Finding appropriate mechanisms to stimulate and improve the cooperation between different ministries and agencies responsible for DRR and CCA is essential. In this regard, Regional and National Platforms play an important role. Cooperative agreements would benefit from a situation where criteria and funding for adaptation and disaster risk reduction programmes required collaboration among DRR and CCA stakeholders and agencies. Beside these points, important challenges remain with regard to spatial, temporal and functional scale mismatches.

In order to ensure that strategies for DRR and CCA span different timescales and spatial scales as well as recognize different types of knowledge, it is essential to also modify and re-direct adaptation and disaster risk reduction funding mechanisms. For example, more flexible DRR-funding, to include the opportunity to utilize the money received for a specific disaster to implement medium- and long-term adaptation strategies, is needed. In addition, funding for adaptation strategies and measures should not be based on the individual strategy alone, but should include a procedural requirement linking different actors at different scales while considering the benefits and costs of the adaptation measures at different temporal scales. Inclusive adaptation strategies and respective funding mechanisms would also need to provide incentives to bring together different types of knowledge, such as expert and local knowledge and to evaluate potential commonalities and conflicts.

Finally, one has to address mismatches between governmental/formal adaptation strategies and norms on the one hand and non-governmental/informal adaptation strategies and norms on the other. It would be naïve to assume that such divergences between different norms could be easily eliminated.

A recommendation would be to first identify and reveal these mismatches between different norm systems in order to create a basis from which to address them.

*Joern Birkmann, United Nations University,
Institute for Environment and Human Security (UNU-EHS¹)*

¹ UNU-EHS is Member of the German National Platform DKKV

Methodology

This report presents hereinafter the main findings of the survey that the European Forum for Disaster Risk Reduction (EF-DRR) Working Group (WG) on CCA and DRR carried out in 2012 under the coordination of the Norwegian National Platform.

The survey aimed at assessing the level of linkages between CCA and DRR in European countries national strategies and plans, and looked at how this linkages have been established.

The survey was responded by 24 European countries (table 1).

The information provided were analysed and findings reported in this succinct report were presented at the fourth session of the EFDRR (23-25 September 2013, Oslo, Norway).

For more details about the outcome of the survey, a presentation of the results is available on the PreventionWeb:

http://www.preventionweb.net/files/27513_12efdr3oct2012croatiawg1andreassen.pdf

The findings led at recommendations from the EFDRR WG

(Table 1)

24 Countries responded to the survey:

COMPLETELY:

- Albania
- Azerbaijan
- Belgium
- Bulgaria
- Croatia
- Czech Republic
- Finland
- France
- Germany
- Georgia
- Moldova
- Norway
- Poland
- Portugal
- Slovenia
- Spain
- Sweden
- Switzerland
- The former Yugoslav Republic of Macedonia
- Turkey

PARTIALLY:

- Andorra
- Belarus
- Malta
- United Kingdom

Main Findings

National strategies

Of the 24 countries which responded, 13 countries have national strategies or policy documents which facilitate DRR to be part of national work on CCA. Further, a number of countries have reports, research articles and other documents describing or facilitating the two issues to be linked together. In most cases, the respondents refer to national or local legislation or to resolutions/decrees.

However, the survey shows that many countries have included CCA as part of their DRR agenda, independent of such strategies.

CCA is on the DRR agenda in Europe

Altogether 19 countries report that their National Platforms/HFA focal points have climate change adaptation in the agenda. It is an essential part of national DRR strategies for a number of countries, and includes vulnerability assessments in a variety of sectors such as health, water and sanitation, infrastructure, building and construction, agriculture, and land-use planning. In some cases, the link is formalized by integrating adaptation into national plans, strategies, and programs for DRR; and vice versa. Box 1 summarizes the results of the survey on how and through which tools the European NPs and HFA Focal Points link DRR to CCA link DRR to CCA.

(Box 1)

How National Platforms/HFA focal points link DRR and CCA:

- Policy/strategy/program documents
- Legislation
- Joint activity plans
- Joint participation in national programs/strategies
- Conferences, seminars, meetings
- Working groups/workshops
- Research projects, research centres
- Bilateral projects, partnerships
- Guidelines
- Mapping and GIS on major risks
- DRR authority runs CCA portal (website)
- Monitoring and evaluation of project impacts
- Capacities to monitor and respond to climate change impacts
- Adaptation measures at local, regional and national level
- Building actions, urban planning, land-use planning

Which impacts?

The respondents were asked which climate change impacts are the most relevant for their own work on DRR. Box 2 summarizes the results of the answer received from the countries..

Which climate change impacts do you consider to be most relevant for work on disaster risk reduction in your country?

(Box 2)	Respondents
Floods	20
Forest fire	15
Extreme precipitation	15
Drought	13
Heat wave	13
Landslides	12
Sea level rise	11
Cold wave	10
Extreme wind	9
Storm surge	7
Change in biodiversity	7
Other	8

Under 'other', the following was mentioned: Flares & venting of accompanied gas during oil production; thawing permafrost, melting glaciers, melting ice in the Arctic; heavy storms with hail, high snow, sleet; damage to forest and other natural habitats from insects

The answers clearly show that flood is the most prominent hazard throughout Europe, followed by forest fires and extreme precipitation and drought/heat waves.

Among coastal countries, sea level rise and storm surges are also important impacts of climate change.

This is also consistent with the information from international and national databases which indicate hydro-meteorological disasters as the first cause of economic losses in Europe.

The SREX Report

(Box 3)

In 2012, the Intergovernmental Panel on Climate Change (IPCC) launched the Special Report "Managing the risk of extreme events and disasters to advance climate change adaptation" (SREX).

The report highlighted as virtually certain to increase in the frequency and magnitude of warm days and nights and the fact that there is already a medium confidence that in Europe we observed an increase in heat waves.

This will have an impact on the most vulnerable part of the population such as the elderly.

The knowledge base

There are still important gaps to fill regarding the knowledge base for assessing risks associated with climate change.

9 countries report that they make use of methodologies for taking climate change into account in national or local risk and vulnerability analyses. Yet, 14 countries have carried out assessments of vulnerability to climate change as shown in Box 4).

(Box 4)

14 Countries have carried out overall assessments of vulnerability to climate change:

- Albania
- Azerbaijan
- Croatia
- Czech Republic
- Finland
- Georgia
- Norway
- Poland
- Portugal
- Slovenia
- Spain
- Sweden
- Switzerland
- The former Yugoslav Republic of Macedonia

These analyses vary in scope and content – some covering only specific sectors or regions; others cover the country as a whole and a variety of sectors. Assessments are carried out by various stakeholders such as government agencies or committees, NGOs, international organizations, or research groups.

Databases for collecting information on disasters should have been developed in 14 countries; they contain information on physical or economic losses. Naturally, there is strong correlation between the hazards reported as most prominent and the content of the databases. 13 of the databases contain information of floods and an equal number on forest fires. Landslides, extreme weather events, sea level rise and changes in biodiversity are also covered in various databases.

However, knowing that disaster information is often scattered in a variety of databases and in many various forms, there is probably much to achieve by continue working on more structured and unified information on disaster losses in Europe. This will also benefit the work on CCA in European countries.

Some European countries started to explore the possibility of establishing national database on disaster losses which are both comprehensive of all relevant risks and interoperable with international standards already used by several countries worldwide (see box 5)

The web-based European Climate Adaptation Platform (Climate-ADAPT, see box 6), an initiative of the European Commission, was launched in March 2012 and since then is hosted and maintained by the European Environment Agency

(EEA). There is an effective link DRR-CCA in Climate-ADAPT through a specific section on DRR under the EU sector policies section.

The EU promoted in April 2013 the adoption of a EU Climate Change Adaptation Strategy which guide EU countries in harmonizing adaptation actions and included DRR as pillar for effective governance of CCA (more information on Box 7).

DesInventar

(Box 5)

Latin America, in recent years has advanced in the adaptation of a standardized methodology in data collection of disaster losses (DesInventar). While other regions such as North America and Asia Pacific have also initiated to standardize the way in which countries collect data on disaster impacts, Europe until last year (2012) did not have any country adopting an international standard for collecting information on disaster losses.

In 2013, five European countries expressed interest to test DesInventar: Albania, Croatia, Italy, Serbia and Turkey. Their results can drive the use of this methodology in other countries in the region.

CLIMATE -ADAPT

(Box 6)

The European Climate Adaptation Platform (CLIMATE-ADAPT) aims to support Europe in adapting to climate change. It is an initiative of the European Commission and helps users to access and share information on with an effective link DRR-CCA in Climate-ADAPT through a specific section on DRR under the EU sector policies section:

- I. Expected climate change in Europe
- II. Current and future vulnerability of regions and sectors
- III. National and transnational adaptation strategies
- IV. Adaptation case studies and potential adaptation options
- V. Tools that support adaptation planning

The CLIMATE-ADAPT portal is accessible at: <http://climate-adapt.eea.europa.eu/>



EU Adaptation Strategy

(Box 7)

On 16 April 2013, the European Commission adopted the EU strategy on adaptation to climate change. The Strategy sets out a framework and mechanisms for taking the EU's preparedness for current and future climate impacts to a new level. In a related measure, the Commission also adopted a Green Paper on the insurance of natural and man-made disasters, to launch a wide debate on the adequacy and availability of existing insurance options.

The EU Adaptation Strategy has three objectives. (Box 7)

- 1. Promoting action by Member States:**
The Commission encourages all Member States to adopt comprehensive adaptation strategies (15 have strategies as of mid-2013²) and will provide guidance and funding to help them build up their adaptation capacities and take action. The Commission will also support adaptation in cities by launching a voluntary commitment based on the Covenant of Mayors initiative.
- 2. Better informed decision-making** by addressing gaps in knowledge about adaptation and further developing the European Climate Adaptation Platform (Climate-ADAPT) as the 'one-stop shop' for adaptation information in Europe, linking it to other platforms. Climate-ADAPT helps to provide for a better understanding of the state of play of research on adaptation and adaptation policies, projects, programmes and frameworks. Adaptation case studies and good practices have been identified, as well as a mapping of national and international activities.
- 3. Promoting adaptation in key vulnerable sectors** such as agriculture, fisheries and cohesion policy, ensuring that Europe's infrastructure is made more resilient, and encouraging the use of insurance against natural and man-made disasters.

Estimates of future costs and benefits indicate that each euro spent on flood protection could save six euros in damage costs. Floods killed more than 2,500 people, affected more than 5.5 million and caused



² The countries are Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Lithuania, Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom (source: <http://climate-adapt.eea.europa.eu/web/guest/adaptation-strategies>)

direct economic losses of more than €90 billion over the period 1980-2011. The minimum cost of not adapting to climate change is estimated at €100 billion a year in 2020 and €250 billion in 2050 for the whole EU.

The strategy states that in the face of uncertainty over long-term impacts, it makes sense to begin with adaptation measures that are flexible and low-cost, good for the economy as well as the climate. In this way, adaptation will promote sustainable growth, stimulate climate-resilient investment and create new jobs, particularly in sectors such as construction, water management, insurance, agricultural technologies and ecosystem management.

Drivers and obstacles in linking CCA and DRR

The Legislation and institutional framework stands out as main drivers for linking work on CCA and DRR. The importance of legislation is mentioned both by countries that have relevant legislation in place, and those who have not. Further, political awareness, knowledge and resources are vital elements in bringing this work further and strengthening the ties between DRR and CCA.

Similarly, respondents point to the lack of legislation and institutional framework, undefined responsibilities and lack of knowledge as main obstacles for linking DRR and CCA. Lack of resources concerns material, human, and economic resources. There are also uncertainties about concrete climate change impacts on local level and how to manage them.

The survey shows that although there are strong links between CCA and DRR throughout Europe, the two issues are often managed by different agencies. Thus, differing cultures between CCA and DRR authorities are also pointed out as an obstacle or integrating CCA into DRR policies and vice versa. Yet, the respondents point to the advantages of coordinating efforts in these two issues; avoiding duplication in advocacy and education; increasing efficiency, and improving understanding of the interdependence of natural processes and their consequences for society. The answers also indicate that stronger focus on CCA leads to stronger focus on disaster prevention and will in turn improve planning processes at different levels.

Recommendations

Based on the outcome of the survey, the European Forum for Disaster Risk Reduction Working Group on CCA and DRR recommends the following:

1. Member countries should continue to strengthen the link between CCA and DRR, integrating CCA into DRR policies, plans and actions, and vice versa.

Internal coordination, transfer of knowledge, and transfer of technical experiences in DRR/CCA into policy and legislation processes are essential for strengthening resilience at all levels. National Platforms for DRR already play a key role in coordinating such actions as well Regional Platform and for which are essential in addressing the transboundary dimension of climate-related risks.

2. In order to facilitate a framework for DRR and CCA, the post 2015 HFA (HFA 2) could be based on four key elements for strengthening resilience and reducing vulnerability.

These principles can also represent different stages in planning for DRR and CCA:

- **Assess risk and vulnerability** at national, regional and local level. All relevant sectors and stakeholders should assess their own vulnerability, including existing and future hazards which can vary their severity and frequency because of a changing climate
- **Avoid new risk and vulnerability** by ensuring that development does not take place in hazard-prone areas, or promoting risk reduction measures in cases where such development cannot be avoided and strengthening the partnerships with the private sector to avoid generation of risk stocks.
- **Reduce existing risk and vulnerability** through preventive measures in already developed areas, including technical installations; building enforcement; improving infrastructure; community awareness, etc.
- **Manage remaining risks** by strengthening disaster preparedness and response at all levels, including monitoring and (early) warning systems; preparedness plans; reconstruction programs; etc.

3. The post 2015 HFA (HFA 2) shall include concrete, hands-on principles for implementation of CCA measures.

Such principles would be strongly correlated with principles for disaster prevention, and might include:

- Development of a stronger knowledge base.
- Use of land-use planning to enhance resilience.
- Building codes/building restrictions that take existing and future risks into account.

- Development of safe and robust infrastructure.
- Resilient urban development.
- Prevention through management of ecosystems and agriculture, etc.
- CCA and DRR mainstreaming through legislation and institutional changes.

4. The UNISDR, having a coordinating role for DRR in the UN system and towards other international organizations and stakeholders, would serve as a resource for coordinating CCA efforts across sectors and agencies.

EFDRR would especially highlight the importance of the UNISDR and the post 2015 disaster risk reduction framework (HFA2) in enhancing resilience and reducing vulnerability to present and future climate impacts at regional, national and local levels.

Case Study 1: Poland - Education and training versus extreme natural hazards

In Poland the attitude towards hazard problems was changed in recent years. Now it can be characterized by integrated and unanimous approach towards natural disaster problem:

- Integrated approach means that research, legislation, control and measurement, economic, technical, educational, social and insurance problems relating to hazards are developed parallel and they are equally treated,
- unanimous approach to natural disasters relates to inseparable consideration of the extreme event, which may be caused by both natural as well as anthropogenic phenomena. For victims or degraded environment followed by those events it makes no difference whether it was formally qualified as an extreme event caused by natural powers, or as a result of technical catastrophe. In both cases assistance is essential.

Floods, which are considered the main hazard, need special and comprehensive activities to be taken. Over recent years floods strike every year in much stronger extent than before. In the Institute of Meteorology and Water Management - National Research Institute (polish acronym IMGW PIB) we are trying systematically to rise the knowledge about extreme events, their mechanisms (origins), protection and recovery (relief) methods. Various initiatives and many activities are undertaken. Direct education of adults is difficult, but its efficiency improves every year. In the organized form it can be done only at courses and workshops. In adult education, influence of young people on their parents and adults through undertaking common flood prevention activities were carried out. Hence, various special training programs for teachers are conducted, which aim at, among others:

- kinds of floods and their origin;
- threat posed by flood to people, environment and infrastructure;
- histories of local floods;
- local flood protection systems, warning systems and flood response system (extent of hazard, alert system, recommended methods of behaviour before, during and after flood);

- individual methods of flood protection;
- methods of flood recovery.

The program is realized by:

- classes (special didactic materials are created in the form of ready-to-use lesson outlines, exercises, films and internet services);
- meeting with people professionally coping with flood prevention;
- site workshops and interviews with inhabitants (looking for and protecting signs of “high water”, listening to memories about past floods);
- preparation and organization of exhibitions (working out local flood history on the basis of historic materials and inhabitants’ memories);
- practical classes (presentation and popularization of correct behaviours during the flood);
- excursions (acquainting with methods of technical means of flood protection - embankments, retention reservoirs).

Other examples are workshops provided by Centre for Hydrological and Meteorological Education localized in IMGW PIB. They are multi staged for regional and local leaders and for people, who are responsible for concrete tasks like representatives of companies, press etc. The program includes, among others:

- assumptions of regional flood protection policy (catchment and river basin-wide);
- financial policy in this scope (flood insurance, possibilities of financial support for local projects to improve flood protection);
- identification of flood threats in catchment and river basin;
- identification of flood losses origins;
- methods to decrease flood losses;
- operational flood response system;
- level of inhabitants’ hazard preparedness;
- co-operation with the media;
- methods of flood recovery.

Case Study 2: Norway: Troms, Northern Norway: Use of climate services – what data at which level?

The integration of climate services in planning is often highlighted in international fora as the key to develop resilient communities in a future climate. But how detailed data is needed about both present and future climate, and for what purposes? A pilot project in Troms County, Northern Norway, seeks to find out.

The Norwegian Civil Defence Act imposes all municipalities to carry out cross-sector risk and vulnerability assessments as a part of their planning. The assessments should make the basis for disaster prevention and emergency preparedness, and should take both current and future hazards into account. Thus, knowledge about climate change impacts is an important part of the assessment and should be included when relevant.

The Norwegian Directorate for Civil Protection (DSB) is responsible for guiding and following up this work at municipal level, through the county governors. As a part of this, DSB has since 2007 had the responsibility for the Norwegian Climate Adaptation Program, coordinating work on climate change adaptation at national, regional and local levels.

Experience in this program from cooperation with the municipal level has shown that disseminating knowledge about climate change and its impacts is not enough to enhance adaptation at local level. A better way to address the issue is to focus on local planning processes and on ways in which adaptation can be integrated at different stages of planning. Knowledge about climate change does not provide answers to what municipalities should do; climate services represent only a part of the knowledge base needed, and it is more important to look at how such knowledge can be utilized in planning processes, policy making and definition of measures for prevention of natural hazards than only looking at results from climate research. When using climate services as a part of the knowledge base for planning, it is important to be aware of which climate data is available, which relevance they have and how they can be used for planning purposes.

The climate adaptation program at DSB therefore initiated a pilot project in cooperation with Troms County Governor, the Norwegian Water Resources and Energy Directorate (NVE), the Meteorological Institute (Met.no), as well as selected municipalities in Troms County. The project looks at a number of climate change impacts; floods, landslides, rock slides, avalanches, sea level rise/storm surges, extreme wind, heavy precipitation, etc., and examines the status of

available knowledge on each of them in relation to different levels of planning. Then, it looks at the needs for data at overall levels for planning, such as the social element and the land-use element of the municipal master plan, and needs at more detailed levels such as zoning plans, building permits and sector plans. The requirements for data are regulated through the Civil Protection Act (overall and cross-sector disaster risk reduction); the Planning and Building Act (concerns new developments); and the Technical Regulations for buildings and infrastructure (provides safety standards for floods, landslides and other hazards).

A preliminary finding of the project is that data requirements are different on each level of the planning hierarchy and that the requirements are lower at the highest levels. Basically, for overall planning, much can be done with very basic knowledge about climate change and there is little need for specific data. Data needs at lower levels of planning are more specific – for example, detailed knowledge about flood levels is important for zoning plans when developing new areas. However, downscaling of climate projections make them more uncertain, and planning at very detailed levels must take high uncertainties into account. Therefore other factors also become important, such as knowledge about past and current weather conditions and extreme events, knowledge about topography, soil, vegetation, and existing buildings/installations, and considerations about life expectancy of the planned measures. Further, the need for data varies from sector to sector.

One aim of the project is to define a minimum set of data which the Norwegian Climate Service Centre, (established by NVE, Met, and UniResearch) can offer to municipalities. Another aim is to better enable municipal planners to define if – or when – they need additional data, to guide them in how to specify their needs to the climate researchers, and how to use them in combination with knowledge about local conditions, social and economic development, institutional framework, legislation, etc. in planning processes at different levels. It is in combination with a range of other sources of knowledge and practice, that climate services can make an impact on the development of resilient societies.

Pilot Project on Climate Services for Local Planning - Troms County, Norway			
<i>Land-use planning and zoning plans - preliminary results per September 2013</i>			
Climate impact*	Legislation	Current vs. future climate	Need for more data
Floods	Plan and Building Act and Technical Regulation: Safety classes 1/20; 1/200 and 1/1000	Flood caused by melting snow is not expected to increase. Flood caused by precipitation expected to increase 20 per cent.	More detailed mapping of danger zones, improved estimates for flooding
Sea level rise/storm surge	Plan and Building Act and Technical Regulation: Safety classes 1/20; 1/200 and 1/1000	Estimated sea level rise 2050-2100 given in report by DSB**. Must be supplemented with knowledge about local conditions (wave height, soil, vegetation, etc.)	Local estimates for wave height and water levels to supplement local projections for storm surge.
Ice break up/jam	Technical regulations under Plan and Building Act: General regulations for natural hazards	Probably more frequent freezing/melting cycles in the future. Ice likely to break up at higher altitudes than today.	More research incl. mapping of vulnerable areas combined with knowledge about local conditions.
Extreme precipitation	Plan and Building Act: Municipal planning must take climate change into account	Data on current climate and future (2050/2100) projections available.	More detailed maps of extreme precipitation
Urban flood	Plan and Building Act; Water Resources Act; Pollution Control Act	Depends on local calculations	Need more data on future climate 2050/2100. Local mapping necessary.
Temperature/growing season	Plan and Building Act: Municipal planning must take climate change into account	Data on current climate and future (2050/2100) projections available.	More detailed maps of growing season.
Avalanches	Plan and Building Act and Technical Regulation: Safety classes 1/1000 and 1/5000	Covered by existing hazard maps (where available)	More research on effects of climate change on avalanches
Landslides/mudslides	Plan and Building Act and Technical Regulation: Safety classes 1/1000 and 1/5000	Current climate sufficient.	As for avalanches. Need info about soil and ground water conditions.
Rock falls	Plan and Building Act and Technical Regulation: Safety classes 1/1000 and 1/5000	Current climate sufficient.	As for avalanches.
Deep-seated rock slides causing tsunami	Technical regulations under Plan and Building Act	Current climate sufficient. Covered by existing hazard maps (where available)	Calculations and maps for tsunami height
Quick clay slides	Plan and Building Act and Technical Regulation: Safety classes 1/1000 and 1/5000	Current climate sufficient. Increased erosion might affect risk for slides.	Need for improved methodology for hazard mapping, including previous soil samples
Wind	Plan and Building Act: Municipal planning must take climate change into account	Little knowledge about effects of climate change on wind. Planning must be based on knowledge about current local wind conditions.	More detailed knowledge about wind and changes due to climate change.

*Direct and indirect impacts

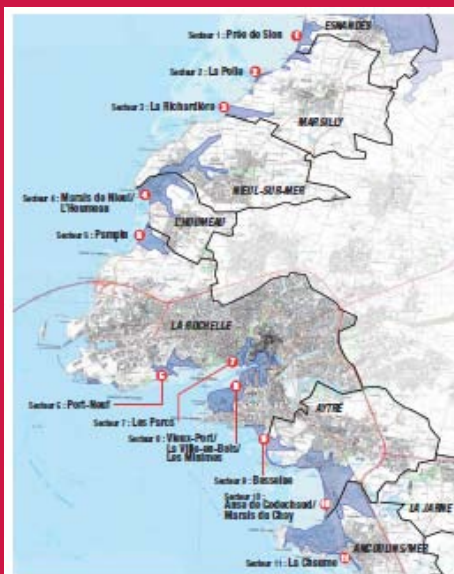
**Directorate for Civil Protection

Case Study 3: France - PAPI: a prevention program against floods taking into account climate change

Between 27 February and 1 March 2010, the violent windstorm Xynthia crossed Western Europe and hit harshly the Atlantic coast of France, mostly the shores of Vendée and Charente Maritime, including La Rochelle and its vicinity.

The area around the city of La Rochelle is subject to storm surges that may cause coastal flooding. The most recent and still well remembered events are those of 1953 in the North Sea³, 1999 (Storm Martin) and 2010 (Xynthia) on the Atlantic Coast. If the 1953 event remains the most grave in Europe, historical studies show that the French Atlantic coast has suffered more events of that type than the shores of the North Sea. Considering the most recent one, four people died close to La Rochelle⁴ and 750 ha of territory were flooded (including the historic harbour of the city). This led to identify three particularly vulnerable areas in which houses had to be relocated.

Following this tragic event and given the economic importance of the territory, a Prevention Program Against Floods (PAPI) for coastal flooding was set up by the local authorities (urban communities) and recently approved by the National Commission responsible for evaluating these plans. This PAPI is part of a national plan decided after Xynthia and dedicated to prevent the consequences of rapid submersions due to storm surges and flash floods. The main challenge of the PAPI was to build a new strategy of flood management, involving all the stakeholders of the territory. This strategy is built on a holistic approach and consists of the delimitation of a risk area, the design of protection measures and the functioning of early warning systems etc. All stakeholders were involved at the different stages of the process through a governance structure and all the measures adopted within the prevention plan were evaluated through a Cost-Benefit Analysis (CBA).



After the storm Xynthia. ©Urban community of La Rochelle.



Perimeter of the PAPI. ©Urban community of La Rochelle.

³ 2 000 deaths in the Netherlands, Great Britain and Belgium.

⁴ More than 50 people died during Xynthia.



Perimeter of the PAPI. ©Urban community of La Rochelle.

The PAPI is expected to last for the next 5 years (2013-2017) and takes as a starting assumption a sea level 20 cm higher than the one observed during Xynthia flooding, taking into account the sea level rise due to climate change. This 20 cm higher level would triple the surface of the flooded area and would increase dramatically the people and goods impacted. The new strategy is developed on two main axes. The first one is the risk culture and its integration into the planning and development of backup plans based on early warning systems. The second one is the protection of human, economic and urban-related issues; with a particular focus on touristic ones (the region is highly touristic

in summer). The PAPI includes people's resettlement, the reinforcement of physical protection of the coast (seawalls). The different protection measures are adapted according to the exposure and the strategic challenge of the sector's activities. Typically, the sizing of the protection works has been the main element debated and finally resolved by the CBA.

(Prepared by François Gérard, Board Member, AFPCN, Jean-Philippe Lalande, DGPR, French Ministry of Ecology and Sustainable Development, Alice Azémar, International affairs representative, AFPCN)



**German Committee for Disaster risk reduction
(Deutsches Komitee Katastrophenvorsorge, DKKV)**

Address: Friedrich-Ebert-Allee 38, Bonn 53227 Germany
Website: www.dkkv.org



**National Platform for Disaster Risk Reduction
(‘Samvirkeområdet natur’)**

Directorate for Civil Protection and Emergency Planning, Ministry of Foreign Affairs (DSB)

Address: Rambergveien 9, Tønsberg 3103, Norway
Website: www.dsb.no



Institute of Meteorology and Water Management (IMGW)

Address: Ul. Podleśna 61, Warsaw 01-673, Poland
Website: <http://www.imgw.pl/>



Plateforme nationale pour la prévention des risques naturels majeurs (National Platform for Disaster Risk Reduction)

Organization Profile - Ministère de l'Écologie, du Développement durable et de l'Énergie (MEDDE)

Address: Grande Arche, Tour Pascal A et B, La Défense 92055, France
Websites: <http://www.developpement-durable.gouv.fr/Le-Conseil-d-Orientation-pour-la-15666.html>, <http://www.afpcn.org>



UNISDR Europe

14 Rue Montoyer, 1000 Brussels, Belgium
<http://www.unisdr.org>



EUR-OPA Major Hazards Agreements

Agora 1 quai Jacoutot
67075 Strasbourg Cedex, France
<http://www.coe.int/euoparisks>



**European Commission
Directorate-General for Climate Action,
Adaptation Unit (DG Clima)**

Brussels B-1160
Belgium
<http://ec.europa.eu/echo>