



German Contributions to the World Conference on Disaster Risk Reduction

14–18 March 2015
Sendai, Japan

Editor:

German Committee for Disaster Reduction (DKKV)

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Foreword



During the last 20 years the number of natural disasters around the world has doubled; in the first ten years of the 21st century alone, the economic damage is estimated to have been 891 billion US dollars. The poorest of the poor are especially hard hit by extreme weather events. They lose their possessions, their livelihoods and, in the worst case, their lives. Most of them have few possibilities to prepare for disasters and are completely at the mercy of the elements. However, in highly developed industrialised nations, too, extreme weather events can cause devastating damage. The flood disaster in New Orleans or the aftermath of the tsunami in Japan made that abundantly clear.

Through risk analysis, early warning systems and effective disaster risk prevention, states can actively prepare for the impact of extreme weather events. That was the aim of the Hyogo Framework for Action, adopted in 2005, which contained clear priorities as to how disaster risk prevention can be improved at local, national and international level. Germany, too, has been guided in its actions by the Framework for Action during the last ten years.

In order to implement the Framework for Action, the Federal Foreign Office has helped partners in disaster-prone states to improve preventative measures at local level. With our Preparedness Initiative, we have helped bring about a paradigm shift in international humanitarian assistance.

The Principles of Preparedness agreed in Berlin in 2013 contain guidelines on forward-looking humanitarian assistance which supports people on the ground before any disaster has occurred. Furthermore, our package of measures on the humanitarian impact of climate change also serves to process the findings of climate research so that they can be used by humanitarian actors.

Good disaster risk prevention is the most effective form of help. The better disaster risk prevention is implemented, the less likely a country is to be reliant on outside help if disaster strikes. The third UN World Conference on Disaster Risk Reduction will adopt a new framework which will succeed the Hyogo Framework for Action, which is due to end this year. The Conference will give us an opportunity to use the experience we have gained during the last ten years to develop new methods and approaches. Our main goal will continue to be to strengthen disaster risk prevention, establish early warning systems on the ground and to improve disaster management at local, regional and national level.

Dr. Frank-Walter Steinmeier
The Federal Foreign Minister

Whilst more and more people around the world are threatened by natural hazards, poor people in particular lack the means to protect themselves effectively against extreme natural events. According to the United Nations, almost 90 per cent of all fatalities as a result of such events occur in countries with high levels of poverty. Disasters often trigger a chain of subsequent problems, such as poverty, malnutrition, homelessness, epidemics, migration and even armed conflict. The development progress that our partner countries have achieved is in danger. However, in industrialised countries, too, disasters can have major impacts – particularly on the economy – as floods in Germany have shown us.

German development cooperation is addressing this challenge. We are involved in efforts aimed at improving prevention and establishing a global system of disaster risk management, in order to reduce people's vulnerability in the face of natural events. Scientific prognoses for the next 15 years assume that about 325 million people will be at acute risk of falling victim to a natural disaster or an extreme weather event unless we are able to make progress on reducing poverty and on disaster risk management.

That is why, as part of its development cooperation, Germany is involved in the efforts of bilateral and multilateral alliances to implement an up-to-date integrated disaster risk management approach. Since 2014, this work has also been carried out through the Global Initiative on Disaster Risk Management (GIDRM) founded by the Federal Ministry

for Economic Cooperation and Development (BMZ). The GIDRM makes German expertise and know-how specifically available to affected countries.

The World Conference on Disaster Risk Reduction in Sendai can make a crucial contribution towards global disaster risk management. In 2015, a watershed year in many respects, the international community needs to step up its efforts to protect more people from extreme natural events. Germany is strongly involved in the process of negotiations for the revision and renewal of the Hyogo Framework for Action. We support an ambitious Framework that will strengthen capacities and ownership in our partner countries in the field of preventive action, and will get particularly vulnerable groups of people actively involved in efforts to combat climate change.

The examples described in this brochure demonstrate the wide range of activities in which Germany is engaged. However, they are also a reminder that we must not cease in our efforts if we want to be able to provide people with effective protection against the risks of tomorrow.

Dr. Gerd Müller

Federal Minister for Economic Cooperation and Development



Words of Welcome



During the first World Conference on Disaster Reduction in Yokohama 1994, the UN-member states and other states agreed to combine their efforts on Disaster Risk Reduction within the so called Yokohama Strategy. Furthermore, the conference represented the mid-term review of the International Decade for Natural Disaster Reduction. More than 10 years after the first World Conference 168 States agreed during the second World Conference 2005 in Kobe, Japan upon the "Hyogo Framework for Action". The ultimate goal of the Hyogo Framework for Action was to "Build the Resilience of Nations and Communities" and all efforts have been focused to increase resilience and reduce risk. In order to achieve this goal, the framework defined five priorities of action, along with Disaster Risk Reduction (DRR) activities, which have been implemented in the last 10 years.

The Yokohama strategy already outlined the importance of social aspects when dealing with Disaster Risk Reduction. The Hyogo Framework for Action highlighted in one of its priorities the need to reduce the underlying risk factors. This required short-, mid-, and long-term approaches and the collaboration across sectors, scientific disciplines and last but not least across borders and continents. Additionally the collaboration of all stakeholders in the field of DRR remains one of the most important factors to reduce disaster risks. We are now at a stage, where a lot has been achieved, however tremendous efforts need to be undertaken to cope with new challenges.

The preconditions for successful disaster risk reduction are known, however natural disasters remain a global threat, not only for less developed states but also for wealthy societies. Additionally, new hazards are appearing, increased urbanization

and demographic changes are becoming serious challenges for communities and states. Therefore, it is important that experts from all over the world discuss with state representatives and civil society how to address future challenges and incorporate these in the new framework. Moreover, the results of these discussions have to be turned into concrete action on local, national, regional and international level.

It remains pivotal for effective disaster risk reduction, that disaster risk reduction remains a cross cutting issue which takes a broad approach. The concept of national platforms has proven to be effective when it comes to organize collaboration and coordination of stakeholders involved in disaster risk reduction. This compilation of different approaches to reduce and manage disaster risks is a reflection of the broad expertise of the DKKV. It describes how members of the DKKV are addressing certain aspects of DRR not only on the national but also on the international level.

We are looking forward to develop new technologies, approaches, tools and strategies in order to increase resilience and managing risk. Therefore, we hope that our perspectives will contribute to the success of the third World Conference on Disaster Risk Reduction.

A handwritten signature in blue ink, which appears to read 'Gerold Reichenbach'.

Gerold Reichenbach

German Committee for Disaster Reduction
Chairman

Introduction

Since publishing the HFA in 2005, many countries and organizations have implemented disaster risk reduction strategies. In 2005, 168 countries agreed on taking action to reduce their disaster risk through comprehensive, integrated and multidisciplinary approaches. In 2013, almost 90% of the countries report the integration of disaster risk reduction (DRR) in some form. Germany hereby takes a pro-active role in implementing disaster risk reduction policies and methods. Demonstrating the importance of prevention, research and transfer of knowledge, triggering political debates or further insurance possibilities are just a few but outstanding examples of the current debate and demand further input.

Technical experts of the relevant ministries, governmental and non-governmental organizations and scientific institutions in Germany were invited to provide their input for more resilient communities and states. A coherent presentation of the German contribution to disaster risk reduction for the WCDRR has been the result. The German Committee for Disaster Reduction (DKKV) – the National Platform for Disaster Reduction within ISDR – therefore presents a compilation of the most recent scientific approaches and practical solutions.

On the following pages of this publication, which was produced thanks to the financial support of the Federal Foreign Office, the reader will find more detailed information on how multiple German organizations aim to achieve further Disaster Resilience. The need for more comprehensive approaches to further understand the impacts of disasters in near-real time are necessary, whereby the detection and observation potentials for disas-

ter management are an important contribution to DRR. The importance of rapid exposure and vulnerability mapping, but also the appropriate training to overcome natural hazards are emphasized. Furthermore this publication stresses the expert contributions to the Working session presented by the DKKV in cooperation with European partners. The Side Event focuses on recent flood events in Europe and respective lessons learned. Evidence from different European countries is reviewed and recommendations for improved flood risk assessment and management are illustrated. At the end, the session examines which conclusions can be drawn for other countries presenting the results in posters at the exhibition booths.

The German organizations will also be presenting their contributions in the following sessions.

Projects are being presented to the public in the Open Forum:

- ▶ Posters and publications
- ▶ An exhibition booth, held jointly by all DKKV partners
- ▶ A Side Event on flood events in Europe and the respective lessons learned – Flooding in Europe – new risks and strategies to build resilience

The contributions of German institutions and organizations include:

- ▶ Flooding in Europe – new risks and strategies
- ▶ Expert Symposium on Multi-Hazard Early Warning Systems and Services (MHEWS)
- ▶ Strengthening the resilience of the tourism sector
- ▶ Achieving disaster resilience, advancements in development partner policy and practice

Partners

Federal Office for Civil Protection and Disaster Response
www.bbk.bund.de



Deutsche Gesellschaft für Internationale Zusammenarbeit
www.giz.de



Global Initiative Disaster Risk Management
www.gikrm.de



Welthungerhilfe
www.welthungerhilfe.de



Center for Disaster Management and Risk Reduction Technology
www.cedim.de



Karlsruhe Institute of Technology
www.kit.edu



German Aerospace Center
www.dlr.de



German Red Cross
www.drk.de



Global Fire Monitoring Center
www.gfmc.org



GFZ German Research Centre for Geoscience
www.gfz-potsdam.de



University of Potsdam
www.uni-potsdam.de



Enhance – Partnership for Risk Reduction
www.enhanceproject.eu



Fondazione Eni Enrico Mattei
<http://www.feem.it>



Grantham Research Institute
www.lse.ac.uk/GranthamInstitute



University of Stuttgart
www.uni-stuttgart.de



European Environment Agency
www.eea.europa.eu



Federal Foreign Office
www.auswaertiges-amt.de



Federal Ministry for Economic Cooperation and Development
www.bmz.de



A comprehensive competence in german disaster risk management



Federal Office
of Civil Protection and
Disaster Assistance

The protection of one's population from serious danger to human welfare – or Civil Protection – is a key component of the national security architecture of Germany. In 2002, the Federal Government and the federal states (better known as "Laender") agreed a "New strategy for the protection of the population in Germany" which emphasizes emergency preparedness and disaster prevention. It underlines the joint responsibility of the Federal Government and the "Laender" in situations which threaten serious damage to the welfare of the nation.

The Federal Office of Civil Protection and Disaster Assistance (BBK) was established in 2004 as an agency of the Federal Ministry of the Interior (BMI). In accordance with the Federal Civil Protection and Disaster Assistance Act (ZSKG) BBK has, among others, the statutory obligation for:

- ▶ Development of national risk analysis
- ▶ Warning and informing the population
- ▶ Education, further education and training
- ▶ Support of municipalities to prepare for emergencies
- ▶ Technical and scientific research

The BBK is a point of contact for stakeholders in civil protection and disaster assistance due to its range of user-oriented services and its science-based expertise.

Through its work, the BBK contributes to the implementation of the Hyogo Framework for Action. For instance, the BBK is committed to raising **public awareness** through various channels, e.g. at professional and trade fairs, through publications, its web-site and – brand-new – a twitter channel. A particular emphasis is put on reaching children and young people: In 2011 the BBK launched an educational website for children aged seven to twelve. The websites www.max-und-flocke-helferland.de conveys knowledge on how to deal with hazards and raises awareness for the importance of voluntary work in civil protection. Children and young people learn how to behave (and of course avoid it in the first place) in case

of fire, first-aid and how to prepare for an emergency, thus gaining knowledge which will have a lasting and positive effect on their lives. Part of the campaign are teacher-workshops and events with children. The aim is to allay children's fears of emergencies and disasters and strengthen their resilience. Addressing specific age-groups is rather unusual in the EU, so to promote this innovative approach the BBK started to establish an EU-wide platform for this website working with its counterparts in Austria and Romania.

In 2010 BBK and BMI joined forces with the Association of Augsburg relief organizations and the Augsburg Puppet Theatre, a marionette theater based in Augsburg, to produce a special show with puppets on strings for children aged three to six - "Rettet die Retter" (Save the Rescue Team – Adventures in the Emergency World). The Augsburg Puppet Theatre has been widely popular with parents and children alike since it started producing TV shows in the 1950s. Initially adapting fairy tales, they soon started creating their own scripts, many of which have become modern classics with their characters featuring in popular culture. The aim of the project is to encourage children and younger people to volunteer. The 1.7 million volunteers form the backbone of civil protection in Germany, they are mainly retained fire fighters, volunteers in first aid charities or with the Federal Agency for Technical Relief. Due to demographic changes and changes in the social fabric less people decide to volunteer nowadays. The earlier people start engaging in **voluntarism**, the more likely they are to keep their commitment up throughout life.

Demographic changes are not the only topic of global concern which is addressed by BBK. Some degree of climate change has become inevitable, hence we need to start preparing. This will reduce the impact of future costs and damages. In 2008 the German Strategy for **Adaptation to Climate Change**, was established as framework for a medium-term national adaptation process. In 2011 an Adaptation Action Plan followed with objectives and options for more actions. It includes

specific government activities for the coming years and links to other national strategic processes. Civil Protection features as a cross-cutting issue focusing mainly on extreme weather events. Preparing for and responding to these events is part of the current day-to-day role of emergency services. More frequent severe weather will create new challenges for everyone involved in disaster and crisis management including providers of critical infrastructure. The cross-cutting nature of civil protection requires cooperation and networking of all stakeholders. Already in 2007 the Strategic Governmental Agencies Alliance had been founded by BBK, the Federal Agency for Technical Relief (THW), the Federal Environment Agency (UBA), the German Weather Service (DWD) and the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). They closely cooperate with joint preparation of workshops and seminars, exchange information on a regular basis and jointly conducted research. Their main focus is a strategic and operational view of extreme weather events.

Germany faces a range of risks beyond severe weather and therefore a national risk analysis has been implemented since 2010 in accordance with the ZSKG. It is key to the advancement of the German System of National Security and part of the "New strategy for the protection of the population in Germany". BBK developed a risk assessment method for civil protection which has been made available to the Laender. Its implementation is currently piloted by several Laender. The findings of the national risk analysis serve as basis for information and decision making for a risk-based and needs-driven planning of prevention and preparedness activities. The Federal Government uses the risk analysis also to capture hazards of national importance. The outcome, the "Joint Hazard Estimation of the Federal States and the Federal Government", compiles hazards which exceed day-to-day events and identifies risk hotspots, required additional capabilities and means to reduce vulnerability. BBK also engages in a regular exchange on risk management methods and results with its European neighbors and partner countries across the world. For instance, from 2009 to 2012 BBK took part in the Sino-German Disaster Risk Management Project. The primary objective was to improve the Chinese risk management system. German BBK-experts trained colleagues in two Chi-

nese provinces in risk analysis methodology and supported their emergency planning processes and the preparation and conduct of emergency exercises. The analyses provided the basis for the restructuring and improvement of regional emergency plans. In December 2012 the project was completed with a strategic level exercise in Chongqing.



Puppets on strings in action: performance of "Save the Rescue Team" in Augsburg



Risk management training in Chongqing



The two protagonists of the BBKs children's website

 www.max-und-flocke-helferland.de

Prepared by:

Julia Poppitz, Claudia Eiselt,
Susanne Krings, Susanne
Lenz, Janine Rohwer

Achieving Disaster Resilience – Advancements in Development Partner Policy and Practice



Background

The adoption of the Hyogo Framework for Action (HFA) formalized a long-term shift in global disaster risk management (DRM) thinking, placing far greater emphasis on the need to integrate disaster risk considerations into sustainable development policies, planning, and programming at all levels. This shift in thinking has influenced the support provided by development partners, as reflected in their policies and assistance covering both disaster risk reduction and post-disaster response over the past decade.

The scope of stand-alone disaster risk reduction interventions has widened to place increasing emphasis on non-structural and policy-related support, as well as more traditional structural interventions. Development investments across a wide range of sectors, such as **water resource management and integrated urban development**, are increasingly embedding disaster and climate risk consideration as an integral part of project design in hazard-prone areas. So too, development assistance for post-disaster reconstruction is utilizing the opportunities presented by disaster events to build back better, strengthening resilience to future hazard events.

Thematic Approach

Germany has recently introduced a Global Initiative on Disaster Risk Management (GIDRM), which is coordinated by GIZ. The initiative brings together a wide range of stakeholders from developing, emergent and industrialized nations working in public administrations, academia, civil society and the private sector, and provides a forum for new and innovative ways of collaboration in disaster risk management. By leveraging each other's comparative advantages the GIDRM aims at contributing to the implementation and up-scaling of effective solutions in three priority areas: disaster response preparedness and civil protection, resilient critical infrastructure and economic cycles, and early warning systems.

The proposed Side Event, to be jointly organized by the Asian Development Bank and the Global Initiative on Disaster Risk Management (GIDRM) coordinated by GIZ, will discuss how the DRM-related policies and practice of selected development partners have evolved over the life of the HFA.

Objective

The event will improve knowledge and understanding of shifts in DRM policies and practice adopted by development partners, lessons learned, challenges encountered, and directions going forward to ensure that development assistance takes account of disaster risk and contributes to strengthened disaster resilience.

The event will enhance the understanding and capability of development partners to contribute towards the successful implementation of the post-2015 framework. By highlighting outcomes of good practice, the event will also encourage wider commitment to the implementation of the new framework.

The event will showcase good practices relating to DRM policies of development partners and their investments both in standalone DRM initiatives and in other development projects that embed disaster risk considerations. Examples will include policies and practice for strengthening disaster resilience in the water sector.

Prepared by:
Stephan Huppertz,
Global Initiative on Disaster
Risk Management / GIZ

In cooperation with ADB

Strengthening Resilience in the Tourism Sector

Background

A single disaster event has the potential to cause widespread damage and economic disruption, affecting private and public investments in tourism destinations, and the country's image and reputation, while posing a threat to the lives of tourist, workers and surrounding communities.

The United Nations Global Assessment Report (GAR) in 2013 has identified tourism as one of the **fastest growing but also most severely exposed sectors** due to the location of many destinations in hazard prone areas such as on cliff tops, and along rivers and coastlines. In many countries tourism has contributed significantly to the development and plays an essential role in local, national and global economies. Direct and indirect losses from disasters have major impacts on communities relying on tourism as their primary source of income and on the national economy. This can be explained by the fact that tourism is an interactive relationship among tourists, public and private businesses, host governments and communities. Due to the growing importance of tourism worldwide, any disruption to tourism arrivals can seriously undermine business competitive-ness and sustainable development, thus affecting a country's image and making it less attractive to foreign investors and visitors.

However, there is a growing recognition of the **importance and value of disaster risk management in the tourism sector** that needs a more systematic approach to ensure long-term competitiveness and sustainability. This includes the need for a comprehensive framework to address existing disaster risks, to prevent the creation of future risks and to strengthen the resilience of the sector. Poorly planned and managed tourism development can easily exacerbate at-risk conditions. Thus risk-sensitive investment planning is crucial to avert economic losses and protect lives.



Given its picturesque view, many hotels and resorts are built along beautiful – but vulnerable – coastlines and are highly exposed to natural hazards.

Contributions at the WCDRR

Side Event: Hotel Resilient Initiative

The German Government has recently introduced the **Global Initiative on Disaster Risk Management (GIDRM)**, which is coordinated by GIZ. The initiative brings together a wide range of stakeholders from developing, emergent and industrialized nations working in public administrations, academia, civil society and the private sector, and provides a forum for new and innovative ways of collaboration in disaster risk management. By leveraging each other's comparative advantages the GIDRM aims at contributing to the implementation and up-scaling of effective solutions in three priority areas: disaster response preparedness and civil protection, critical infrastructure and risk-sensitive economic cycles, and early warning systems.

To promote improved climate and disaster risk management and to strengthen resilience in hotels and throughout destinations, the GIDRM is cooperating with the United Nations Office for Disaster Risk Reduction (UNISDR) and the Pacific Asia Travel Association (PATA) to build on the rec-



Federal Ministry
for Economic Cooperation
and Development



giz

ommendations of the GAR to implement effective disaster risk management through certification programs and voluntary rating systems. Working with a wide range of public and private stakeholders, the Hotel Resilient Initiative aims to develop standards and tools for hotels and resorts that can be used to demonstrate disaster resilience to customers and clients, promoting resilience, whilst creating standardized approaches and market value.

The Side Event provides **reference for private sector involvement in disaster risk reduction**, and public-private partnerships that can go beyond preparedness to risk reduction and risk prevention. The Hotel Resilient Initiative presents its research findings and framework for developing risk management standards, tools and instruments to strengthening resilience in the tourism sector. Planned contributions include panelists from PATA, UNISDR, government representatives from partner countries and representatives from the private tourism sector, as well as technical partners (e.g. TÜV Rheinland –t.b.c).

Working Session Tourism

Together with UNISDR, PATA, Japan Tourism Marketing (JTM) and the World Tourism Organization (UNWTO), the GIDRM is also part of the Co-organizing Committee of the Working Session on Tourism. The Session will focus on mainstreaming disaster risk reduction into tourism development and **connecting the tourism sector with national disaster risk and emergency management structures**.

The aim of the Working Session is to discuss opportunities and challenges for the tourism sector to collaborate with the sectors responsible for disasters to mitigate risks, and to plan, respond and recover from disaster events; to explore existing activities in the tourism sector to build their resilience and reduce their risk towards hazards; and to enhance the understanding of the tourism sectors' critical systems, functions, skills and capacities that can be utilized for strengthening national and community resilience.

Planned contributions

Keynote:

Mr. Thomas Silberhorn, the Parliamentary State Secretary to the Federal Ministry for Economic Cooperation and Development in Germany

Panel Participants:

Dr. Dirk Glaesser, UNWTO

Carolyn Thompson, Australian Emergency Management Institute (AEMI)

Mr. Jorge Angulo, Director of Disaster Risk Management, Ministry of Tourism Cuba

Ms. Filomena Nelson, Deputy CEO, Ministry of Natural Resources and Head of NEMO, Samoa

Mr. Masato Takamatsu, JTM

Ms. Jayne MacDougall, Director of Risk Management and Loss Prevention, Le Meridien Hotels (on behalf of the Hotel Resilient Initiative)

Outlook

The Hotel Resilient Initiative plans to address small, medium and larger hotels, while recognizing their different requirements and capacities, to develop standards, tools and checklist and to pilot these in up to three selected destinations in the Asia-Pacific region.

Prepared by:

Hanna Maier,
Global Initiative on Disaster
Risk Management / GIZ

Good Practice Review – Disaster Risk Reduction

Background

Published in March 2004, the Humanitarian Practice Network (HPN) Publication “Disaster risk reduction: mitigation and preparedness in development and emergency programming (Good Practice Review 9)”, written by John Twigg, quickly established itself as a core resource on DRR for field agencies, training courses and universities. With its wide range of coverage and operational focus, it filled a major gap that other guidance and text books had not addressed. It was also timely. It helped to support the rapidly growing interest in DRR that led to, and was further stimulated by, the World Conference on Disaster Reduction in January 2005 and the publication of the Hyogo Framework for Action 2005-2015.

GPR 9 has been one of HPN's most enduringly popular publications. The original print run of 4,000 copies has long since been distributed free of charge, mostly to HPN members. Electronic copies, also available as open-access documents, continue to be downloaded in large numbers. Copies are also held in institutional libraries – GPR 9 is a widely used textbook on a number of courses in DRR and disaster management. The work is regularly cited in other publications, both academic and operational.

In 2013 a revision of the GPR 9 was initiated by a team of experts under guidance of John Twigg. Research assistant(s) with specialist knowledge of particular aspects of DRR helped to gather data, literature and case study material, focusing on areas where there has been the most development in the past decade or where only limited evidence was available at the time the 1st edition was written (e.g. vulnerability and capacity assessment, urban risk management, long-term recovery, monitoring and evaluation). The revision of GPR 9 is funded by BMZ, DFAT and DFID.

ODI/HPN in cooperation with GIZ has organized the side event: Launch of executive summary and introduction of 2nd edition of Good Practice Review 9 – Disaster Risk Reduction and host a multi-speaker panel including a representative of the Japan CSO Coalition (JCC) to discuss the relevance of the book.

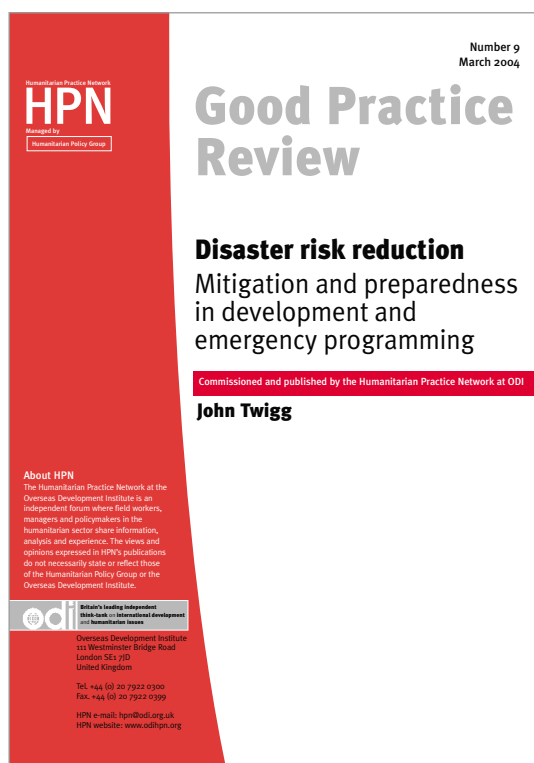
Wendy Fenton (HPN) – Chair

Nicolas Lamade (GIZ) – Discussant

Bruno Haghebaert (Global Network) – Discussant

Mihir Bhatt (All India Disaster Mitigation Institute / AIDMI) – Discussant

Representative from the Japan CSO Coalition (JCC) – Discussant



Prepared by:

Nicolas Lamade and
Franziskus Bayer,
GIZ in Cooperation with
ODI/HPN



The Welthungerhilfe Approach to Strengthening Resilience



Welthungerhilfe, one of the biggest German NGO for Humanitarian Aid and Development Cooperation, believes in a world without hunger and poverty and in the fundamental right of people to a self-determined life in dignity and justice. Since its foundation in 1962, Welthungerhilfe supports vulnerable people in about 40 countries in Africa, Asia, Latin America and the Caribbean.

As a multi-mandate organization Welthungerhilfe, based on the concept of Linking Relief, Rehabilitation and Development, connects immediate humanitarian aid, medium-term transitional actions and long-term development cooperation.

For achieving Sustainable Food and Nutrition Security it is essential to take into consideration any kind of risk: political, socio-economic and geographical risks as well as risks related to natural weather events and climate change. Based on the experience in development cooperation for decades, achieving sustainable impacts requires a capacity building which allows local stakeholders to take place in the driver seat. There will be no strong and resilient community without community based responsibility.

Since 2005, strengthening resilience has become the main guiding principle for planning and implementing actions at the interface of humanitarian aid and development cooperation meeting the challenge to achieve sustainable impacts. For strengthening resilience, it is essential to build bridges between different stakeholders and sectors and create links to different levels of governmental institutions and civil society actors aligning external interventions with (sub)national strategies. Addressing the challenge of planning actions focused on strengthening resilience, it is essential that the composition of all elements creates local capacities and responsibilities securing that the initiated processes will continue in the long run without external assistance.

The resilience concept claims to offer a new and different way of thinking about both humanitarian aid and development cooperation suggesting to approach the challenges and risks we face in the context of fragility, protracted crises and violent conflicts as well as during periods of recovery and in countries that are particularly exposed to natural hazards and the effects of climate change. Welthungerhilfe understands strengthening resilience as a process that aims to enhance the combined coping (or absorptive), adaptive and transform-



From a civil society perspective, an intervention designed to strengthen resilience must be based on the following principles:

- ▶ **Rights based:** Actions to strengthen resilience consistent with legal obligations to respect, protect, and fulfil universal human rights. This requires actions across rights holders and duty bearers to address structural inequalities, exclusions and injustices that marginalize certain groups and reinforce differential vulnerability – for example ensuring that people can participate in political decision making processes and have access to the necessary natural, economic and social resources.
- ▶ **Equity:** Strengthening resilience, associated with notions of justice and inclusion, for all people regardless of ethnicity, religion, gender, geography, disability or other social-economic status.
- ▶ **People-centered:** Project logic based on local wisdom, realities, real experiences, needs, concerns, and solutions of at-risk populations;
- ▶ **Environmental integrity:** Social-economic development in balance with the carrying capacities of the natural environment, in order to maintain biodiversity and sustain healthy ecosystems for people's well-being and security.

Identifying options for actions to strengthen resilience in determined circumstances requires first the answers to four key scoping questions:

- ▶ Resilience of what kind of system? (livelihood system, socio-political system, ecosystem)
- ▶ Resilience to what kind of shock/stress/hazard? (existing and prognosticated)
- ▶ Resilience for whom and where? (layers, actors, people)
- ▶ Resilience over what timeframe? (short, medium and/or long term perspective)

ative capacities of households, communities and nations, whilst assuring that the well-being and living standards of groups of people and individuals impacted directly and indirectly by an actions are not compromised.

In 2001, Welthungerhilfe started first Disaster Risk Management actions in Nicaragua after Hurricane Mitch, and expanded the concept five years later when it commissioned the study "Disaster Risk Reduction as a principal in Rural Development". Understanding Climate Change as a significant risk for achieving positive impacts of humanitarian aid and development cooperation, in 2011 Welthungerhilfe put in practice its Climate Proofing tool. Welthungerhilfe and its local partner organizations understand DRR as a cross cutting issue.

Currently, Welthungerhilfe participates in the "Resilience Learning Initiative" created by the German Federal Ministry for Economic Cooperation and Development, based on the operation "Ensuring food security of rural population by Climate Change Adaptation and Disaster Risk Reduction" in the north-east of Haiti, in order to operationalize the resilience concept and methods for measuring resilience. In Burkina Faso, Welthungerhilfe participates in the DFID program "Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED)" focusing its action on improving household food security and income, identifying and disseminating best practices in processes to strengthen resilience.

Taking disaster risk reduction seriously, humanitarian aid not only focuses on "affected people" but also on "endangered people". Apart from the long term reduction of underlying risk factors in the context of development cooperation, the humanitarian aid community faces the challenge of forecast based actions. Preparedness for effective response in the context of climate change and climate phenomena requires mechanisms and procedures which allow acting before a foreseen extreme weather event occurs. Humanitarian aid actors should be able to manage robust weather data and, based on established thresholds, initiate actions in an early stage. Currently, Welthungerhilfe participates in the German Foreign Office "Action Plan on Climate Change Adaptation" involving local partners in the pilot countries Bangladesh, Mozambique and Peru.

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A comprehensive approach to better understand disaster impacts and main loss drivers in near-real time



Background

The Center for Disaster Management and Risk Reduction Technology (CEDIM) is an interdisciplinary research center in the field of disaster management founded 2002 by the Helmholtz Centre Potsdam – GFZ German Research Centre for Geoscience and the Karlsruhe Institute of Technology (KIT). The main goal of CEDIM is to advance our scientific understanding of hazards, risk, and disasters and to develop appropriate disaster risk management strategies. For this, CEDIM employs interdisciplinary competence and synergies between its affiliated institutions. The scientific disciplines participating in CEDIM include meteorology, hydrology, geophysics/seismology, earthquake engineering, civil engineering, remote sensing, geoinformatics, economics and social sciences. CEDIM is a contribution to bridging the gap between science and application in disaster management, which focuses on user-oriented and scientifically founded strategies for strengthening disaster risk reduction. Knowledge transfer, stakeholder dialogues and cooperation with key partners such as the German Committee for Disaster Reduction DKKV, the Willis Research Network, and the Earthquake and Megacities Initiative EMI underpin CEDIM's integration into the Disaster Risk Reduction Community.

Thematic Approach / Methodology

Given the high potential of the information flux that emerges during the first days after a disaster via Information- and Communication Technologies, CEDIM in 2011 started a new and comprehensive approach to scrutinize disasters and to examine their main loss drivers immediately after the onset: The near-real-time Forensic Disaster Analysis. The notion "Forensic Disaster Investigation" has been coined by the Integrated Research on Disaster Risk (IRDR) research program. Forensic Investigations of Disasters aim "to uncover the root causes of disasters through in-depth investigations that go beyond the typical reports and case

studies conducted post-disaster events" (<http://www.irdrinternational.org/projects/forin/>).

CEDIM adopts this comprehensive understanding of disasters while incorporating a real-time component to the impact assessment, complementing IRDR activities. The core of CEDIM's new style of analysis is to examine disasters in an inter- and transdisciplinary way with a focus on the complex interactions between (1) natural hazards, (2) technical installations, facilities and infrastructures, and (3) societal structures, institutions, and capacities.

Objectives

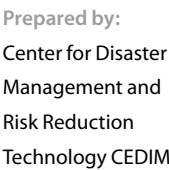
To examine disasters forensically and to identify main risk and loss drivers at an early stage, CEDIM uses its broad interdisciplinary expertise and in-house tools for conducting rapid assessments combined with historical disaster databases. In several research projects, novel tools for rapid analyses are developed and already existing methods and tools for rapid damage assessments are tested and further developed.

Since October 2011, the CEDIM Forensic Disaster Analysis Group published comprehensive reports with rapid analyses and loss estimations for five disasters: the Van earthquake in Turkey 2011, the USA drought in summer 2012, Hurricane Sandy in the Caribbean and the USA 2012, the floods in Germany in June 2013, and Typhoon Haiyan in the Philippines in 2013. The reports, together with additional short reports about other small scale disasters, are published on the CEDIM's webpage www.cedim.de, and additional summaries are provided on the recently established Helmholtz Earth System Knowledge Platform www.eskp.de.

To exploit the full potential of the rapid approach in near-real time, CEDIM researchers as a second step examine disasters through in-depth-studies to identify key factors for the disaster impact. Given the death toll and rate of displaced persons after Typhoon Haiyan, for example, researchers are currently investigating the impact of disaster

Outlook

The long-term aim of CEDIM's comprehensive approach is to infer recommendations for Disaster Risk Reduction activities. The extension of CEDIM's near-real-time focus to follow-up studies as well as the orientation towards user needs are first steps in this direction.

 www.cedim.de



Earth Observation Contributions to Disaster Management

Background:

Natural hazards such as floods, forest fires, volcanoes, hurricanes and earthquakes as well as technical accidents and conflicts pose a threat to thousands of people and the economy each year. To prevent hazards from turning into disasters or at least to mitigate their negative impacts, information regarding the event itself as well as the exposed people and infrastructure are essential for decision makers. Earth observation significantly supports the management of natural disasters by providing relevant geo-information.

Thematic Approach using Earth Observation Data

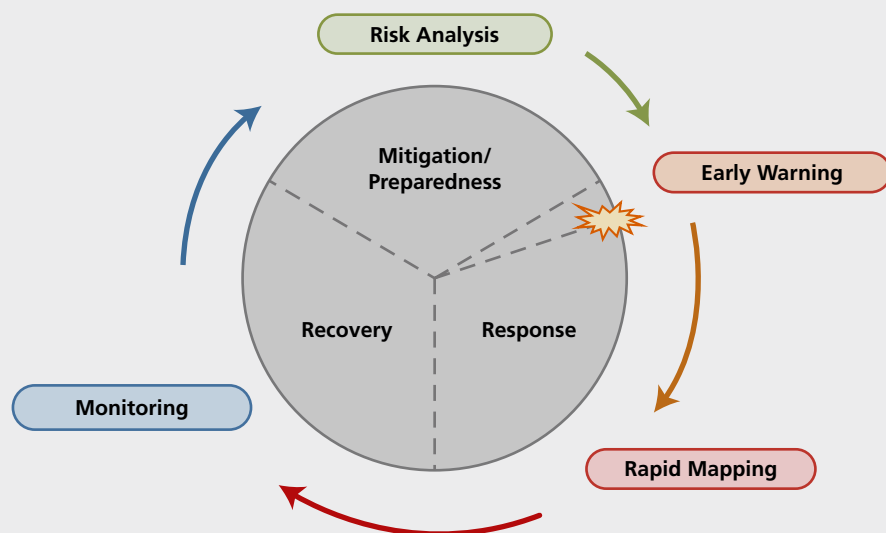
Earth observation provides valuable information for the different phases of disaster management:

- ▶ For the disaster **preparedness and mitigation** earth observation data can contribute to an improved risk assessment by providing spatial information about the elements at risk in the hazard areas.
- ▶ For **early warning systems** earth observation can provide for some hazard types a continuous monitoring from space.

- ▶ During the **response phase**, immediately after a disaster strikes, satellites can promptly acquire images of the affected region. Through rapid mapping activities the satellite data are being analyzed and information like flood extent, burnt area and earthquake damages are extracted.
- ▶ During the **recovery** phase the progress of the reconstruction activities can be monitored and documented using remotely sensed data.

Contributions of the German Aerospace Center (DLR)

DLR is very much engaged in research and development of methods and products based on satellite data for disaster management. Since more than 10 years DLR has been operating its Center for Satellite Based Crisis Information (ZKI). The ZKI is one of the leading organizations in this topic worldwide. It provides a 24/7 service for the fast provision, processing and analysis of satellite imagery after natural disasters, for humanitarian relief activities and civil security issues worldwide. As the development of new products and the improvement of existing ones are largely user driven, DLR closely works to together with differ-



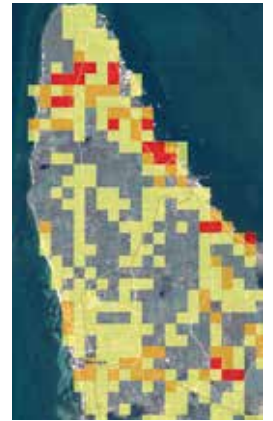
Disaster Management Cycle (grey circle) and Earth Observation contributions related to it

ent stakeholders such as national and international relief organizations. It also offers training and consulting for field practitioners, situation center staff and decision makers.

Moreover, DLR is also member of the International Charter "Space and Major Disasters". The Charter makes space data rapidly available in case of natural or man-made disasters. DLR is contributing data from the earth observation missions TerraSAR-X, TanDEM-X and RapidEye to the Charter and also takes over further operational tasks in the Charter.



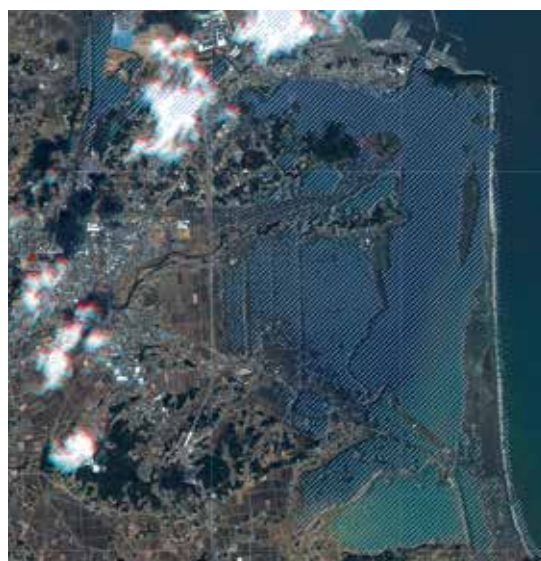
Situation map of the Al-Zaatari refugee camp in Jordan



Damage Assessment Map of Cebu Island (Philippines) after Typhoon Haiyan destroyed villages in November 2013



Tsunami Risk Map of Denpasar, Indonesia



Inundated areas after the 2011 tsunami hit Japan

Monitoring of reconstruction: A school in Banda Aceh before (top), 4 days after (middle) and 6 months after (bottom) the 2004 tsunami



Improved preparedness for response: Meeting the challenge of increasing extreme weather events and climate change risks

Addressing climate change and its humanitarian implications is a central task of the German Red Cross (GRC) taking into account the Red Cross and Red Crescent Movement's core mandate to support the most vulnerable.

Background

The number of people in need of humanitarian assistance has been steadily increasing over the past 10 years and the impact of climate change is partly responsible for this increase. Current and future risks of extreme weathers because of climate change in combination with often unplanned urbanization, limited food security, poor management of natural resources, population growth and extreme poverty represent major challenges, particularly for people living in developing and high-risk countries.

At the same time there are many systems for early warning of the temporarily increased likelihood of disasters available, such as forecasts of storm tracks or weekly rainfall. Looking at rainfall upstream in a river basin, storm forecasts and seasonal forecasts for El Nino and La Nina, the humanitarian system can get such early warnings days, weeks, months and even longer in advance. These scientific information and early warnings provide a crucial window before a potential disaster occurs in which local communities and civil society organizations such as National Red Cross and Red Crescent Societies helping them can take action. This is becoming even more important in a more uncertain and variable climate.

Making scientific information of temporarily increasing extreme weather risks available and operational in the right way offers the opportunity for more efficient and effective humanitarian preparedness for response by taking additional measures of risk reduction and preparing countries, regions and communities on time.

But very often in the humanitarian system there are generally no funding mechanisms that facil-

itate such early action following early warnings, except when an imminent disaster is virtually certain. This is a well-known bottleneck in enabling early action for preparedness to response ahead of disasters. Funding often only becomes available after a disaster has already occurred or it is given for long-term projects based just on average level of risk, not taking into account temporarily increasing risks.

Thematic approach and methodologies

In 2012 the GRC designed a project together with the Red Cross / Red Crescent Climate Centre (RCCC), the Togolese Red Cross and Uganda Red Cross to pilot a new mechanism called "forecast-based financing" that will plug this humanitarian gap between early warnings and early action. These 6 years of pilot projects in Uganda and Togo are funded by the German Federal Ministry for Economic Cooperation and Development. Red Cross disaster managers will select activities based on the level of warning that are encoded in Standard Operating Procedures (SOPs) that marry packages of ad hoc risk reduction and preparedness measures with specific alerts and assign responsibilities. The costs of each action are calculated and will be funded with money coming from a preparedness fund established at the Red Cross.

Furthermore, the German Federal Foreign Office is also seeking to improve the utilization of existing short, medium and long-term extreme weather forecasts in order to take action towards effective preparedness in threatened communities, regions and countries before a disaster and to strengthen the humanitarian system to improve its preparedness for response mechanisms.

Therefore the Federal Foreign Office developed an action plan to face the humanitarian challenges of climate change. The GRC has been coordinating this action plan since the end of 2014 and is working together with a multitude of actors at different levels, including the International Federation of Red Cross and Red Crescent Societies (IFRC),



Red Cross and Red Crescent volunteers play a central role in strengthening the preparedness for response on a local level.

the Red Cross / Red Crescent Climate Centre, the Welthungerhilfe, UNOCHA and the World Food Programme (WFP).

Objectives and goals

The different partners of this Federal Foreign Office action plan have major experience in the field of climate change and humanitarian assistance both in theory and practice. The action plan consists of the following objectives:

- ▶ Specific projects of GRC, Welthungerhilfe and WFP following the early warning early action approach will be implemented in pilot countries. The main goal of these pilot projects is to improve the preparedness for response capacities of disaster management stakeholders. The different partners of the action plan will work together very closely to identify climate risks, to improve extreme weather forecasts, to identify forecast indicators and thresholds for early warnings and to develop specific SOPs to respond as early and effective as possible to these warnings.
- ▶ The creation of a dialogue platform in Geneva will improve the interaction between climate scientists and humanitarian stakeholders and will use synergies and provide support for the implementation of relevant projects in pilot countries.

- ▶ The different partners including the Federal Foreign Office will use funding mechanisms for preparedness to finance specific SOPs resulting from improved extreme weather forecasts to be able to reduce temporarily rising risks in the pilot countries.
- ▶ Furthermore the Nansen Initiative which is working in the area of climate and disaster induced displacement and is represented in relevant forums worldwide will be supported.

Outlook

The strengthening of preparedness for response and the systematic integration of extreme weather and climate risks is a central task of the international cooperation of the GRC. The GRC is already following an integrated and cross-sectoral approach to strengthen the resilience of the most vulnerable groups, combining emergency relief with long-term and development-oriented measures. The importance of this resilience approach will further increase in the future and strengthening resilience not only means providing protection against natural hazards and improving preparedness, but also comprehensively reducing the underlying factors of vulnerability. In this context, the reduction of health risks, food security and access to water and sanitation are as important as the adaptation to climate change and the reduction of natural hazards.

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The Global Wildland Fire Network: A Policy and Outreach Programme of the Global Fire Monitoring Center (GFMC)

The Problem

Vegetation fires interact with human environmental concerns in terms of catastrophes, carbon and climate. Between 2011 and 2014 more than 776 people were killed by wildfires, 532,000 people were evacuated in wildfire situations worldwide, and a total of 16,100 destroyed houses recorded. Based on modeling it is estimated that annual human mortality due to inhalation of fire-generated particulate matter <2.5 micrometers (PM_{2.5}) may reach 339,000. Permanent transfer of carbon from burned ecosystems, which will not recover after fire, to the atmosphere contributes to about 20-30% of global emissions from fossil fuels. At the present time only a few countries have implemented policies addressing the role, consequences and management of vegetation fires comprehensively and across sectors. None of the international environmental conventions explicitly address vegetation fires as a driver of environmental degradation. There are also not yet protocols in place that provide internationally accepted standard methods and procedures for countries that provide and receive assistance in wildland fire emergencies that would ensure inter-operability, efficiency and safety of cooperating parties.

The Epistemic Community

The Global Fire Monitoring Center (GFMC), an institution of the German Max Planck Society for the Advancement of Sciences and member of the German Committee for Disaster Risk Reduction, established in 1998 with funding of the German Foreign Office, chaired one of the four Working Groups of the UNISDR Inter-Agency Task Force for Disaster Reduction, the Working Group on Wildland Fire. In 2001 this group transited to the Global Wildland Fire Network (GWFN), which since then is serving the UNISDR system as a Thematic Platform. The UNISDR Wildland Fire Advisory Group (WFAG) provides advisory support to the United Nations, to international organizations and governments and is coordinated by the GFMC. This work is also performed in GFMC's function of Associate Institute

of the United Nations University – the think tank of the UN system.

Under the impression of limited coordinated response to the theme of wildland fire in the UN system the GFMC felt obliged to take the initiative for developing a White Paper on Vegetation Fires and Global Change that would unveil the urgency for coordinated international action.

Science, Policy and Practice

The contributions of the White Paper reveal that globally, fire regimes are altering in parallel with and under the influence of socio-economic developments, land-use change and climate change. Increasing vulnerability of society to the direct and secondary effects of wildland fires, as well as the transboundary nature and consequences of wildland fires, are a challenge to countries and international organizations to define their common interests in developing informed national, regional and international policies aimed at enhancing sustainable and integrated fire management capacity. The requirement for systematic and efficient sharing of scientific and technical expertise, solutions and resources, including transboundary cooperation, means that the transition from informal information exchange and networking to a more systematic and formalized cooperation is more necessary than ever.

Focus on Action

Since the 1990s the GWFN and WFAG have significantly contributed to developing cross-sectoral policy dialogue addressing the management of vegetation fires, and have contributed to building capacities in fire management at national level, e.g. in the Eastern Europe, Caucasus and Central Asia (EECCA) region – notably in Armenia, Azerbaijan, Georgia, Mongolia and Ukraine – and in Southeast Europe. This work was mainly implemented under the Environment and Security (ENVSEC) Initiative under the auspices of the Organization for Security and Cooperation in Europe (OSCE) and the Council of Europe through its European and Mediterranean

Major Hazards Agreement (European Open Partial Agreement – EUR-OPA). Numerous countries and regional organizations in South America, Sub-Saharan Africa and Eastern Asia were supported by knowledge exchange between countries and international organizations.

In 2013-14 the German Federal Ministry for Food and Agriculture provided finances to the UN Economic Commission for Europe (UNECE) to entrust the GFMC in convening and following up the UNECE/FAO Regional Forum on Cross-boundary Fire Management. In the follow-up of the Forum the WFAG launched the International Wildfire Preparedness Mechanism (IWPM). The IWPM is a voluntary, non-financial instrument hosted by the GFMC, which offers support to nations to build fire management capacity through exchange of knowledge and expertise.

Wildfire Disaster Risk Reduction and the post-2015 HFA

The Third World Conference on Disaster Risk Reduction will pave the way for a renewed HFA that will provide rationale and suggested action for the post-2015 period. The Global Fire Monitoring Center and the Global Wildland Fire Network will continue to be available for nations, international organizations and the UN system to serve as think tank and advisory body in the attempt to be prepared and capacitated to address the challenging cross-sectoral issues and action needs in wildland fire management at global level, notably in wildfire disaster risk reduction. The epistemic wildland fire community will continue to challenge the UN system to develop voluntary or legally binding commitments to facilitate inter-agency, international and cross-boundary cooperation



Goldammer, J.G. (ed.) 2013. Vegetation Fires and Global Change: Challenges for Concerted International Action. A White Paper directed to the United Nations and International Organizations. Kessel Publishing House, 398 p. Online version: http://www.fire.uni-freiburg.de/latestnews/recent_pub.htm



The IWPM (<http://www.fire.uni-freiburg.de/iwpm/index.htm>) is closely interacting with the International Fire Aviation Working Group (<http://www.ifawg.org/>) and has recently launched the first draft of the Fire Aviation Guidelines with the International Manual of Common Rules for Fire Aviation – a first set of voluntary international standards for safe and efficient international aerial firefighting operations.

Prepared by:
GFMC

 <http://www.fire.uni-freiburg.de/>

GITEWS – the German Indonesian Tsunami Early Warning System



In the light of the 2004 Indian Ocean Tsunami during the World Conference on Disaster Reduction, 18–22 January 2005 in Kobe, Germany offered assistance in constructing a Tsunami Early Warning System for the Indian Ocean. This offer was later accepted by Indonesia and since then the GITEWS (German Indonesian Tsunami Early Warning Project) forms the core structure of the Indonesian Tsunami Early Warning System InaTEWS. The system is operated by BMKG, Indonesia's Agency for Meteorology, Climatology and Geophysics and, based on data from approx. 300 measurement stations, gives at least a five minute warning following a major earthquake. The instrument network comprises seismometers, GPS receivers and tide gauges. The data from these sensors is transmitted in real time to the warning center in Jakarta where, state-of-the-art analysis systems – such as SeisComp3 developed at the GFZ by the GEOFON working group – are used to aggregate the data into a decision support system (DSS) and to convert it to an overall picture of the situation. By comparing the real measurements with pre-calculated scenarios, tsunami

wave heights and arrival times are predicted and corresponding warning levels for the coastline concerned are issued. The process of disseminating warnings by the BMKG is carried out through various and technically independent communication channels and is defined by standard operational procedures.

Thanks to the successful development of the tsunami early warning system and the associated training, Indonesia, alongside Australia and India, was officially granted the status of a Regional Tsunami Service Provider (RTSP) for the Indian Ocean in November 2012 by UNESCO. It took over from the early warning services of Japan and the USA that had been carrying out the service for the Indian Ocean on an interim basis since December 2004. In the case of a major earthquake, the neighboring countries are notified by the respective RTSP of a tsunami threat to their coast.

GITEWS was planned from the beginning as an end-to-end approach. This includes the establishment of instrument networks to measure the natural hazard (earthquake, tsunami), the provision of decision support based on a modelling system to generate assessments of the situation, the execution of a nationwide risk assessment with the creation of hazard, vulnerability and risk maps as well as capacity development to public authorities, local decision-makers and administrations as well as respective local societies and the hotel industry. This work in the various fields of action was carried out in parallel from the initial phase, with on-going coordination between the working areas and the national and international partners involved.

The installation phase of GITEWS involved the development of the required system components on the one hand, and appropriate strategies, information materials, standards and procedures on the other. BMKG, the operator of the early warning system, became operational as part of a gradual process and through different phases of system development. During the GITEWS phase, a number of German institutions, under the auspices of the GFZ German Research Centre for Geosciences, were tasked with the technical design of the system. Contributions from other donor countries were integrated into this work. Capacity development measures down-stream (e.g. disaster reduction strategy) have been implemented in pilot areas together with local authorities and the affected population. These approaches, methods and products such as the Tsunami-KIT (http://www.gitews.org/tsunami-kit/index_en.html, last visit: 30.1.2015) form the basis for a nationwide implementation and are easily transferable to other parts of the Indian Ocean.

A crucial role for sustainable operation is the quality of the services for the community as well as the on-going routine and maintenance work to the system. This involves, in particular, the continuous development of state-of-the-art system components, based on up-to-date knowledge in the science and technology domains with respect to earthquake monitoring, tsunami early warnings, decision support and risk management. These measures were implemented during the PROTECTS project period from 2011 to 2014 following the GITEWS phase. In this way BMKG was reinforced in carrying forward the tsunami early warning system independently.

The GITEWS project was carried out through a large group of scientists and engineers from GFZ German Research Centre for Geosciences (consortium leader) and its partners from the Alfred Wegener Institute – Helmholtz-Centre for Polar and Marine Research (AWI), the German Aerospace Center (DLR), the Helmholtz Centre Geesthacht – Centre for Materials and Coastal Research, the German Marine Research Consortium (KDM), the GEOMAR | Helmholtz-Centre for Ocean Research Kiel, the United Nations University's Institute for Environment and Human Security (UNU-EHS), the Federal Institute for Geosciences and Natural Resources (BGR), the German Agency for Technical Cooperation (GIZ), as well as from Indonesian and other international partners.

Funding was provided by the German Government through its Federal Ministry for Education and Research (BMBF) with an total amount of 60 Million Euros (Grants 03TSU01 and 03TSU07).

Further information: www.gitews.org

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Rapid exposure and vulnerability mapping for natural hazards

Risk is generally treated as a function of three components: hazard, the actual event of concern, whether it be natural (e.g. earthquakes), anthropogenic (e.g. industrial accident) or a combination of the two (e.g. the Fukushima nuclear disaster); vulnerability, meaning how susceptible a population, asset or structure is to the loading imposed upon it by the hazardous event; and exposure, which refers to the compilation of all the elements (in particular the population and built environment) present in hazard zones that are potentially subject to losses.

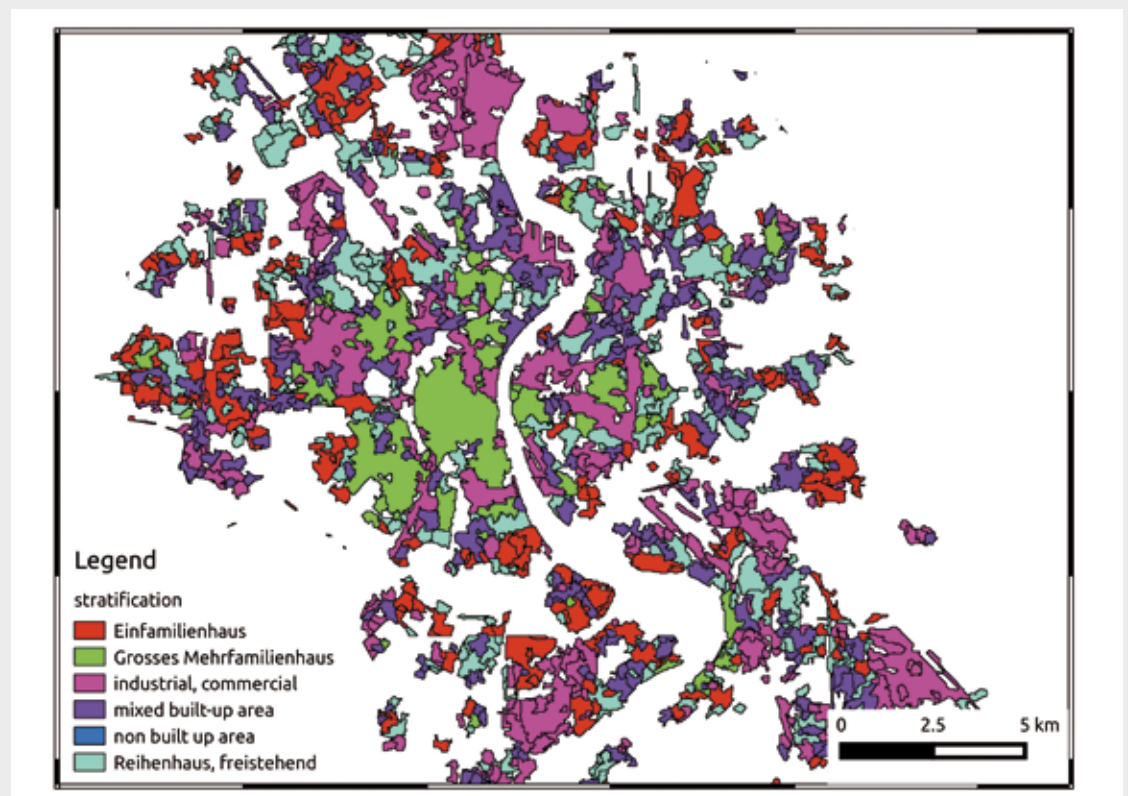
Remarkably, exposure data can be considered largely hazard-independent, provided that the set of structural and non-structural features describing the exposed assets is wide enough to satisfy the requirements of the hazard-specific vulnerability models. The prompt and reliable compilation of an exposure and vulnerability model, especially in urban environments, is the key to any subsequent risk estimation task. Unfortunately, such informa-

tion is often not readily available, while often being affected by significant uncertainty.

GFZ has developed across several projects (e.g., EMCA, PROGRESS, SENSUM) an original approach to rapidly collect and integrate information about the extent and composition of urban environment and in doing so, allowing the development of exposure models, based on the integration of earth observation and mobile mapping technologies and the resulting imagery. The analysis of remote sensing data is used to outline homogeneous areas within the urban area under analysis, as depicted in Figure 1, and to associate them with different types of urban texture.

In a second phase, a mobile mapping system (examples of the visual excerpts from GFZ MOMA system are displayed in Figure 2) may be employed to selectively survey selected target urban areas, collecting environmental information which can

Figure 1: Segmentation of a large urban area (the city of Cologne, Germany) into homogeneous geocells obtained by the analysis of medium-resolution, multi-spectral satellite imagery.



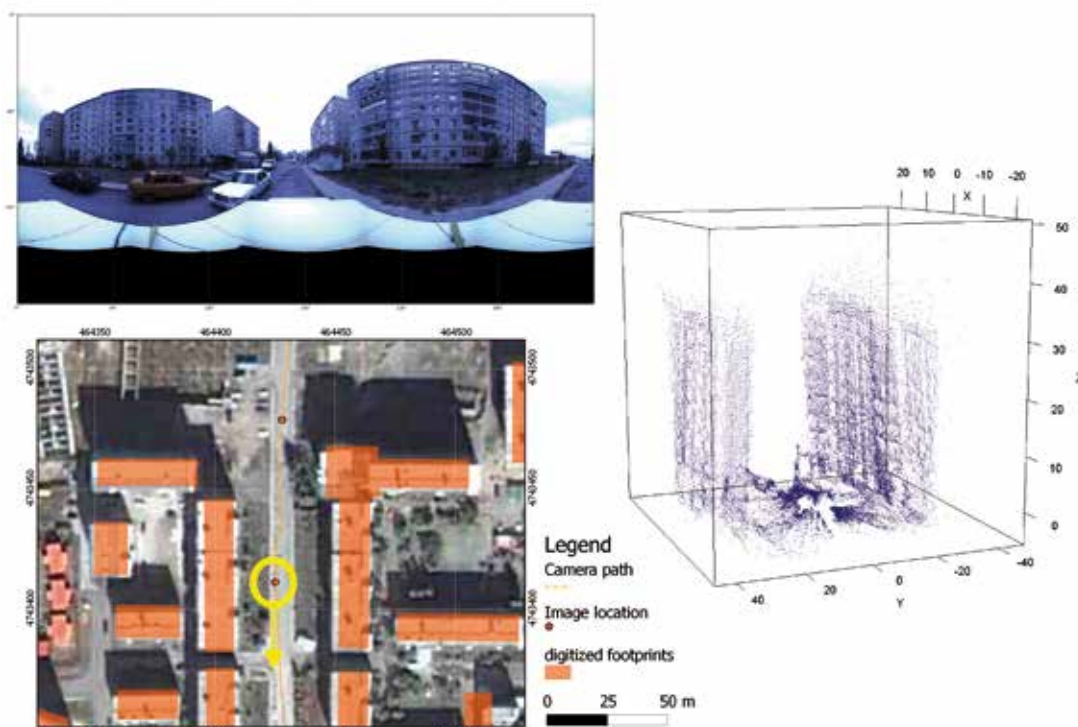


Figure 2: Mobile mapping systems have the potential to provide high-resolution, georeferenced omnidirectional images of urban environments, from which various forms of risk-related information can be retrieved.

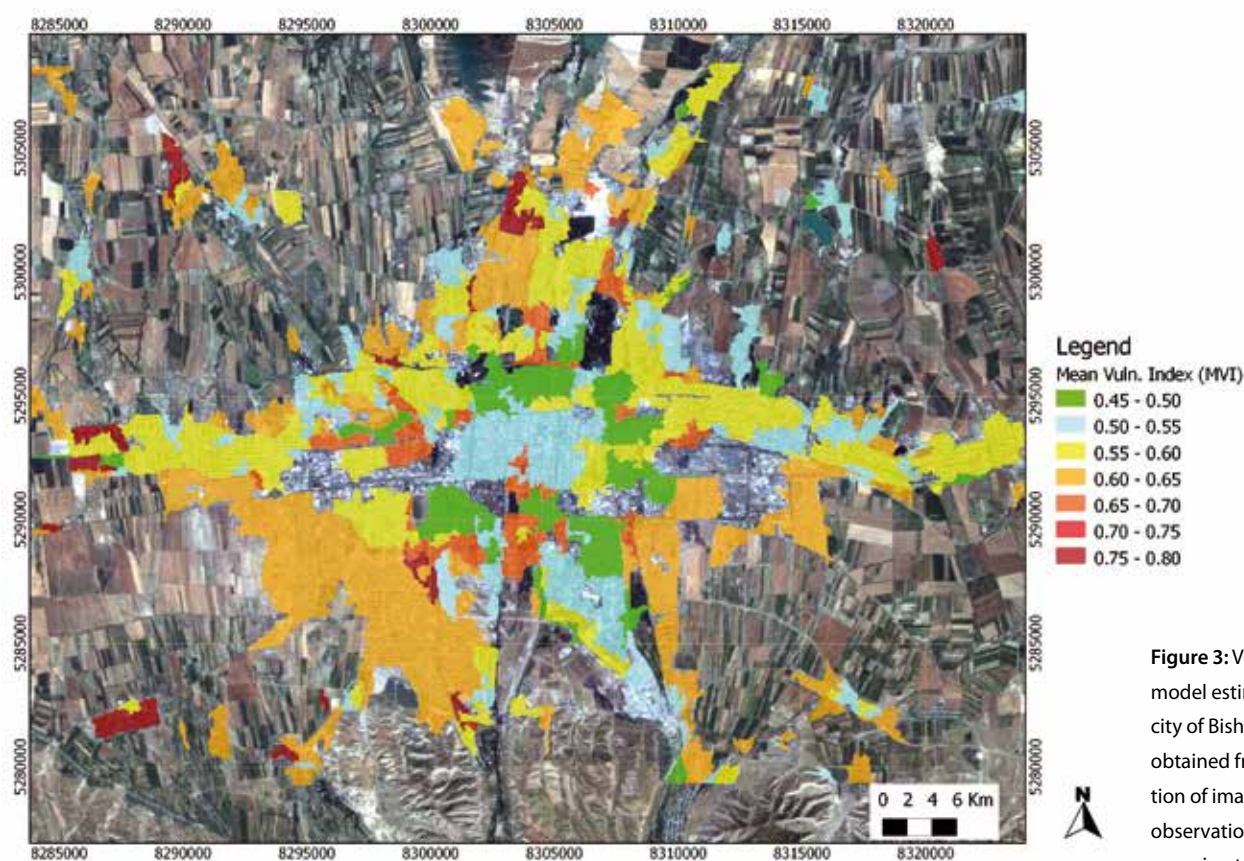


Figure 3: Vulnerability model estimated for the city of Bishkek, Kyrgyzstan, obtained from the combination of imagery from earth observation and mobile mapping technologies.

then be analyzed off-line by experts and processed to obtain a statistical model of the exposed assets. A probabilistic model of the resulting seismic vulnerability can then be estimated, based on the collected information, and used, e.g., to estimate the impact of a damaging earthquake on a populated area. This has proven to be particularly efficient in economically developing countries (for example, Figure 3 shows a model for the town of Bishkek, Kyrgyzstan), where often a reliable estimation of risk arising from natural hazard is hindered by the lack of reliable data.

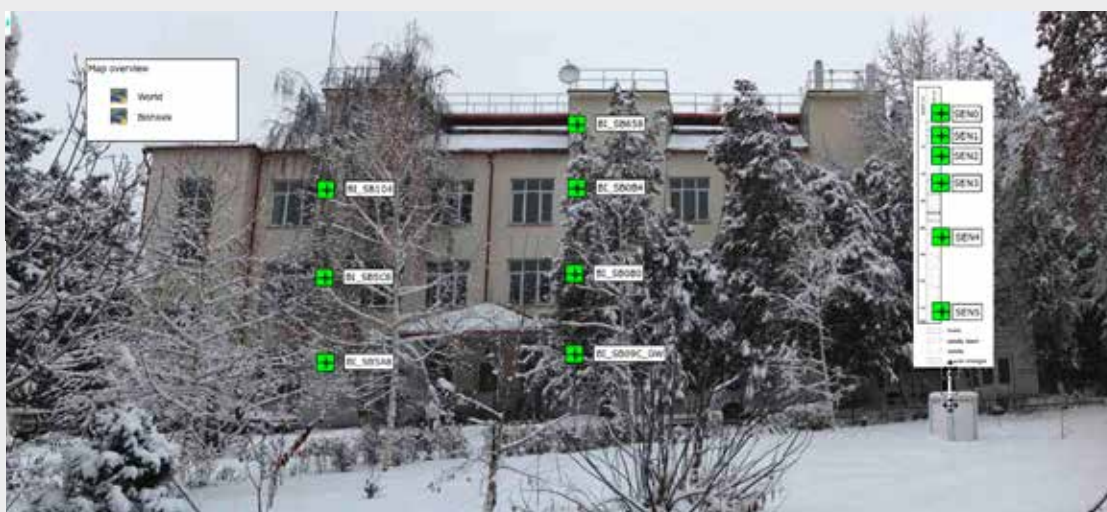
Real-time risk assessment for seismic early warning and rapid response

Technological developments over the last decades are making more feasible the development of earthquake early warning/rapid response systems. Such systems have the potential to allow the reliable estimation of losses in real time, enabling disaster risk reduction (DRR) decision makers and managers to take the most appropriate actions. The combination of regional early warning systems (where the seismic stations are located as close as possible to the seismogenic source(s) generating the event) and onsite ones (where the seismic stations are located at the target sites to be warned) is allowing the narrowing of the blind zone (the area within which an alarm before the destructive wave arrival is not possible). In particular, the potential of decentralized onsite early warning systems (where the onsite early warning analysis is carried out on the single sensor alone) are also improving

the potential for rapid damage identification and the monitoring of structures during aftershock sequences. Following this approach, the GFZ has installed in Bishkek (Kyrgyzstan) in cooperation with the Central Asian Institute of Applied Geosciences (CAIAG), nearly 40 low cost SOSEWIN stations in several buildings in the city (<http://lhotse21.gfz-potsdam.de/nagvis/frontend/nagvis-js/index.php?mod=Map&act=view&show=bishkek>) with the aim of monitoring their behavior, recording strong motion data, and with the intention of them being used in the future for a possible onsite early warning system. Figure 4 describes the distribution of the installed SOSEWIN sensors in the CAIAG building, along with the nearby vertical array of strong motion sensors, the latter installed by the GFZ within the framework of the Global Change Observatory Central Asia (<http://www.gfz-potsdam.de/en/scientific-services/observatories/earth-system-observatories/central-asia/central-asia/>). These sensors will be integrated into a real-time strong motion network that will be installed as part of the ACROSS initiative over the next three years and which should provide the backbone of a regional early warning/rapid response system for Bishkek. Furthermore, instrumentation and the associated communications protocols could also be exploited for multi-hazard and risk warning and assessment, for example, by including meteorological parameters, although such efforts are in the future.

Building upon the above mentioned data sets describing the exposure and vulnerability of the

Figure 4: Distribution of the low-cost SOSEWIN sensors in the CAIAG building. The distribution of the strong-motion borehole sensors in the nearby vertical array is also shown.



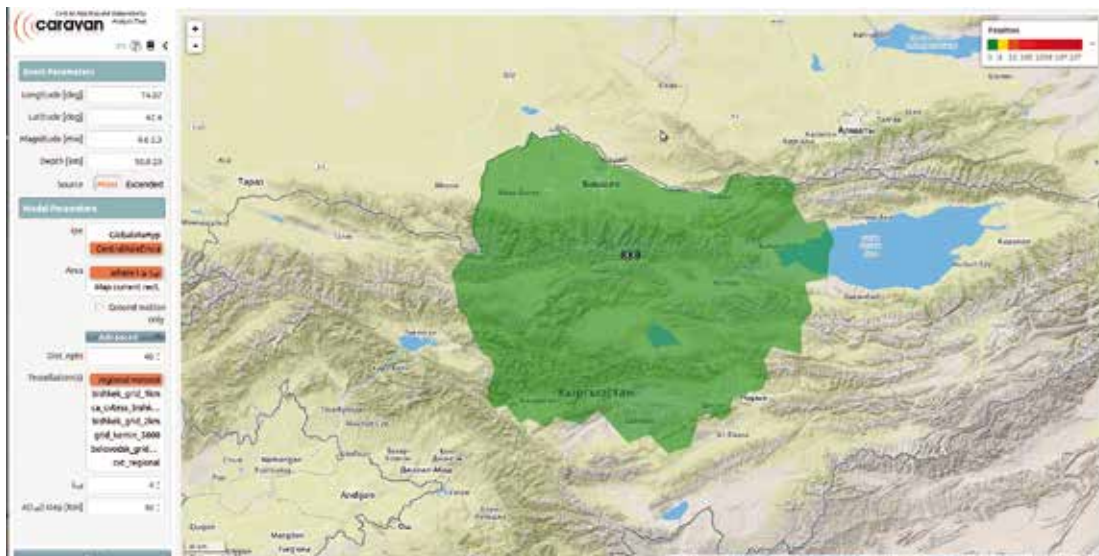


Figure 5: The fatalities distribution estimated and visualized with the CARAVAN software for the mb 4.8, 22 January 2015 earthquake in Kyrgyzstan.

Kyrgyz Republic territory, real-time loss estimation is now possible through the ad-hoc software system CARAVAN developed by the GFZ. CARAVAN is a web application that allows the estimation of the expected consequences for people, the built-up environment and economy, given a certain earthquake scenario. Furthermore, CARAVAN allows end users to compute the consequences of past damaging events in the event of their repetition. The software has multi-lingual support (English, German, Chinese and Russian). Figure 5 shows as an example the expected fatalities distribution of the mb 4.8, 22 January 2015 earthquake in Kyrgyzstan. A complete report on the events, based on the CARAVAN estimations, can be found at (https://gfz-potsdam.de/Session/4890-Sdf4mvXehawzOnpDqi6J-hojqgqv/MIME/INBOX/100014-03-B/Earthquake_kyrgyz_23012015.pdf).

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35 Years International Training Courses on “Seismology and Seismic Hazard Assessment”

Part 1: Introduction

The GFZ German Research Centre for Geosciences (GFZ) organizes international training courses on “Seismology and Seismic Hazard Assessment” annually. They provide theoretical fundamentals and practical training in applied seismology, especially for geoscientists and engineers from developing (earthquake prone) countries. The program is particularly useful for seismological station and network operators, data interpreters and those concerned with seismic zoning and hazard assessment. These postgraduate courses are part of the educational and training program of the UNESCO in the field of geosciences and disaster mitigation.

Part 2: Course Topics and Didactic Approach

The international training courses aim at providing problem awareness, interdisciplinary problem understanding, applicable knowledge and basic skills. Their main goal is the development and strengthening of self-aid capacity in developing countries by way of “on-the-job” training leading to:

- ▶ improved planning, setting-up and effective use of seismological, volcanological and tsunami monitoring and early warning systems
- ▶ more qualified analysis of seismic records and of other earthquake data for research and practice;
- ▶ more realistic assessment of seismic, volcanic and tsunami hazard, vulnerability and risk and understanding of their causes.

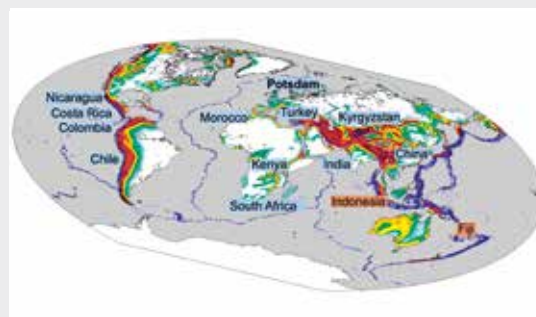
The courses are an integral part of the R&D plan of the GFZ. Since 1992, these 4 week courses are held alternately as world-wide open courses in Germany or as regional courses in earthquake-prone developing countries for participants from Africa, Asia or Latin America. The main topics of the course provide a systematic introduction into the fundamentals of seismology, seismic hazard assessment and risk reduction. Additionally, complementary topics differ from course to course. They are tailored to the prevailing hazards, training needs and expertise existing in the developing countries/regions which host the course.

The GFZ provides the main personnel, financial, organizational, scientific-technical and logistic support to the courses. Regular Sponsor is the German Federal Foreign Office (AA). Additional Ad-Hoc Sponsors are mainly from the hosting institutions and governments in developing countries.

Part 3: Results and Impact

The main target group of the GFZ international training courses are young post-graduate geoscientists, engineers, and disaster managers working in the field of seismology or earthquake zonation, microzonation and hazard assessment. 1.041 participants from 122 countries, amongst them 231 female participants, attended the courses between 1980 and 2014. The table shows the total number of course attendants from different countries. The courses help to establish regional as well as global cross-border networking for better earthquake preparedness of the countries.

At the outset of each course questionnaires are handed out to participants. The actual overall response, the summary assessment for documents and effectiveness with respect to the work of the participants, grasp of the subject by the lecturers and subjects covered by the documents and exercises is evaluated at the end of each course. This feedback helps to improve the next International Training Courses.



The seismic hazard map quantifies the strong ground motion (yellow and red) which has to be expected in the next future during earthquakes (blue). Besides the regular annual courses the GFZ offered special courses after the Tsunamis from 2004 and 2009 in Indonesia and Fiji.

Table of Participants from Country and Numbers over 35 years.

Countries	No.	Countries	No.	Countries	No.
Afghanistan	16	Honduras	1	Peru	5
Albania	7	India	60	Philippines	13
Algeria	29	Indonesia	88	Poland	2
Argentina	12	Iran	58	Portugal	1
Armenia	11	Iraq	7	Puerto Rico	1
Azerbaijan	4	Jamaica	3	Romania	14
Bangladesh	9	Jordan	5	Russia	7
Bhutan	2	Kazakhstan	8	Ruanda	2
Bolivia	7	Kenya	13	Samoa	3
Bosnia	3	Kuwait	2	Saudi Arabia	1
Botswana	3	Kyrgyzstan	23	Serbia	2
Brazil	11	Laos	1	Sierra Leone	1
Bulgaria	11	Lebanon	1	Singapore	1
Burundi	1	Lesotho	2	Sri Lanka	4
Cambodia	2	Libya	3	Slovakia	2
Cameroon	5	Macedonia	5	Slovenia	2
Chile	5	Madagascar	4	Solomon Islands	2
China	77	Malawi	3	South Africa	10
Colombia	16	Malaysia	8	Sudan	8
Congo (DR)	3	Maldives	2	Syria	13
Cook Islands	1	Mali	1	Tajikistan	14
Costa Rica	17	Mauritius	2	Tanzania	6
Croatia	4	Mexico	14	Thailand	7
Cuba	24	Micronesia	2	Timor Leste	1
Czech Republic	3	Moldavia	1	Tonga	2
Dominica	1	Mongolia	9	Trinidad-Tobago	4
Dominican Republic	2	Montenegro	2	Tunisia	2
Ecuador	6	Morocco	10	Turkey	29
El Salvador	4	Mozambique	4	Turkmenistan	3
Eritrea	2	Myanmar	4	Tuvalu	1
Egypt	33	Namibia	2	Uganda	4
Ethiopia	8	Nauru	2	Uruguay	2
Fiji	4	Nepal	6	Uzbekistan	14
Germany	30	New Caledonia	1	Vanuatu	2
Georgia	8	Nigeria	9	Venezuela	15
Ghana	10	Nicaragua	14	Vietnam	16
Greece	3	Oman	5	Yemen	12
Guatemala	2	Panama	1	Yugoslavia	3
Guyana	1	Papua New Guinea	6	Zambia	4
Haiti	2	Pakistan	8	Zimbabwe	3
Hungary	2	Palestine	2		

Total: 1.041

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 www.gfz-potsdam.de

Flooding in Europe – new risks and strategies to build resilience: Side Event by DKKV in cooperation with European partners



Background

In recent years, Europe has suffered a number of severe coastal and river floods revealing that floods are among the most important natural hazards in Europe. Examples include flooding in Central Europe in August 2002 and June 2013, in the European Alps and Eastern Europe in August 2005 as well as in the United Kingdom in 2000, 2007 and 2014. Some events were accompanied by severe pluvial flooding which has evolved as a new hazard type to be considered in flood risk management.

The Member States of the European Union (EU) recognised the need to provide a legal framework to assess and manage flood risks. Therefore, the European Parliament and the Council of the European Union adopted the Floods Directive 2007/60/EC in October 2007. Its ultimate goal is to reduce adverse consequences from flooding, particularly with regard to human health, the environment, cultural heritage and economic activities. This

policy marks an important transition from a purely safety-oriented and often reactive implementation of flood defence schemes towards an integrated and proactive flood risk management.

The EU Floods Directive requires that the member states perform a preliminary flood risk assessment by December 2011, prepare flood hazard and risk maps for areas with (potentially) significant flood risk by December 2013 and establish flood risk management plans by December 2015 that outline plans for the implementation of prevention, protection and preparedness measures. Above all, the Floods Directive demands a review of the preliminary flood risk assessment by December 2018, of the flood hazard and risk maps by December 2019 and of the flood risk management plans by December 2021 and every six years thereafter. By this, risk management is implemented as an iterative optimisation process, which will enable stakeholders to detect changes in risks and requirements for altered or new management measures.



Even though the Floods Directive provides a clear guidance for communities to better prepare for flood risk, including cross-border coordination and management, its implementation is still challenging. The most recent flood events in 2013 and 2014 provide some insights into the effectiveness of this policy and other measures that were implemented on the national and regional levels. Lessons learned after past flood events highlighted the roles of different stakeholders in flood risk reduction, such as governmental and private institutions (e. g. insurances), but also affected individual households and companies. A key conclusion is that risk reduction is still not sufficiently connected to recovery and reconstruction. Cross-border and cross-sector collaborations still require a lot of effort. Therefore, the role and improvements of private-public or public-public-partnerships in risk reduction need to be discussed.

Structure of the Side Event

The session focuses on recent flood events in Europe and respective lessons learned and adapted policies. After a brief introduction, the European Floods Directive and risk management approaches will be outlined. Then evidence from different European countries is reviewed and recommendations for improved flood risk assessment and management are illustrated. The session considers how flood risk reduction from river flooding and flash floods can be integrated into spatial and urban planning. It will be further discussed how risk management could be improved at different scales by reflecting on the current debate on flood insurance in Europe, European policies on disaster prevention as well as the Post 2015 framework. In this context, it is considered how private-public or public-public-partnerships could strengthen a better integration of risk reduction. At the end, the session examines what conclusions can be drawn for other countries.

Expert contributions

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The presentation on the EU Floods Directive will introduce its main principles, including how cooperation is organised to cross-boundary mapping and planning to define objectives and measures on the scale of the river basin district. It will place the focus of the directive on prevention, protection and preparedness within the disaster risk reduction cycle and explain the importance of the revisions of maps and plans on a regular basis to better incorporate newest knowledge and insights, e.g. about climate change.

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The presentation will address new challenges linked to the implementation of the new flood hazard and flood risk maps into legally binding urban and spatial planning documents and plans. Against the background of the European Floods Directive and the amendment of the water legislation in Germany in particular, new flood hazard and flood risk maps have been developed that particularly restrict further urban development in areas that could be impacted by a 100-year flood event. While this is innovative, important challenges still exist with regard to the consideration

of flood hazard and flood risk maps that focus on extreme flood events. Especially the IPCC has underscored that in the context of climate change also past flood hazard patterns might change. Consequently, a strict differentiation of secure and non-secure areas along a 100-year-flood line might be misleading for effective risk reduction and resilience building. New approaches and legal challenges will be outlined with examples from Germany and the United States.

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After the severe flood in 2002 that caused damage of 11600 million EUR, Germany was again hit by widespread and severe flooding in June 2013. Taking the risk management cycle and a comparison of the two events as a framework, recent achievements of flood risk management strategies and measures in Germany, in particular flood warning, risk awareness and private precaution of flood-affected residents as well as flood insurance, will be addressed. This includes a reflection of the implementation of the EU Floods Directive in Germany. Key findings of the project are summarised in the contribution "Analysis of the flood in June 2013: Summary of recommendations for future flood risk management in Germany".

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The presentation explores the current understanding of flood insurance with a specific focus on the ability of flood insurance to contribute to direct risk reduction. The starting point is a consideration of the existing provision of flood insurance, e.g. coverage types, demand levels, and design structures. A review of efforts to analyse and explain the use and design of flood insurance highlights how the understanding of supply and demand determinants is steadily growing, while clear gaps also emerge. Particularly the question of utilizing flood insurance in the context of climate change and as a lever for physical risk reduction would benefit from further empirical and theoretical analysis. The presentation concludes with a reflection on current efforts to reform and design flood insurance and offers some pointers for future research.

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The presentation revisits the multiple forms of partnerships, both public-private and public-public, that have been designed for reducing the impacts or otherwise coping with natural hazard risks, especially floods. Then it delves into the European Union's legislations and regulations through which the partnerships have been directly or indirectly stimulated. These include the policies of consultation and dialogue, inter-institutional and cross-border cooperation, better regulation and good lawmaking, as well as public procurement, concessions, and civil protection mechanism. From this background, the guiding principles for partnerships will be formulated and explored in depth.

Outlook

The session aims at reflecting good practises from Europe such as the European Floods Directive (2007/60/EC) and structured lessons learned studies, e.g., performed after the 2002 and 2013 floods in Germany lead-managed by the DKKV. Furthermore, the event aims at providing impulses for the post 2015 framework for disaster risk reduction with regard to the following aspects:

- ▶ Improved understanding of underlying risk factors of flood risk;
- ▶ Lessons learned from improved flood risk assessment and management in Europe;
- ▶ Role of public-private and public-public partnerships in risk management;
- ▶ Examples for strengthening of people, communities and countries' disaster resilience;
- ▶ Strengthening integrated risk governance at the local and sub-national level throughout the different phases of the disaster cycle by overcoming the mismatch between strategic goals in risk reduction and risk prevention on the one hand and the actual reconstruction approaches after damaging flood events on the other hand.

Moderation

The side event is moderated by Prof. Dr. Kuniyoshi Takeuchi, who is currently advising the International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM), Tsukuba, Japan for which he had served as the founding director between 2006 and 2014. He is a professor emeritus of University of Yamanashi, where he taught hydrology and water resources for 30 years until 2007. Prof. Takeuchi has been involved in many international initiatives, such as the International Hydrological Programme (IHP), the IUGG GeoRisk Commission and the scientific committee of Integrated Research on Disaster Risk (IRDR). In 2012, he received the IAHS-UNESCO-WMO International Hydrology Prize.

Analysis of the flood in June 2013: Summary of recommendations for future flood risk management in Germany



The flooding in June 2013 caused billions of euros damage, and awoke many memories of the floods in August 2002. With a total damage of 11.6 billion euros, the event in 2002 was the most expensive natural disaster in Germany up to now, but it did mark a reorientation towards integrated flood risk management. Even though the course of every extreme event is unique, the event in 2013 enabled an examination of how effective the measures were which politics, administration and civil society have implemented since 2002 and where there is still a need for action in flood risk management.

The analysis highlights considerable improvements on many levels that deal with flood risk reduction and disaster response, in particular in 1) increased consideration of flood hazards in spatial planning and development, 2) comprehensive private precaution and self-provision, 3) more effective early warning and improved coordination of disaster response and 4) a more targeted maintenance of flood defense systems. During the flooding in 2013 in many places this enabled the event to be dealt with more effectively and led to a reduction of damage. Nevertheless, important aspects remain unclear and need to be clarified.

- ▶ **Balanced and coordinated strategies for reducing and overcoming the impacts of flooding:** Technical flood protection always plays a big role in flood risk management. However, extreme events reveal its limitations. In order to remain capable of responding in cases where failures occurred, other areas of flood risk reduction, such as retention, self-provision, warning and disaster response, have to be further improved. Furthermore, the effectiveness of protective installations has to be checked at regular intervals and secured through maintenance and repair measures – also in the forelands of embankments. To achieve a sustainable reduction of damage, preventive measures must be more consistently implemented and also include areas behind protective installations. Replacement or securing of oil tanks represents an important contribution here, in

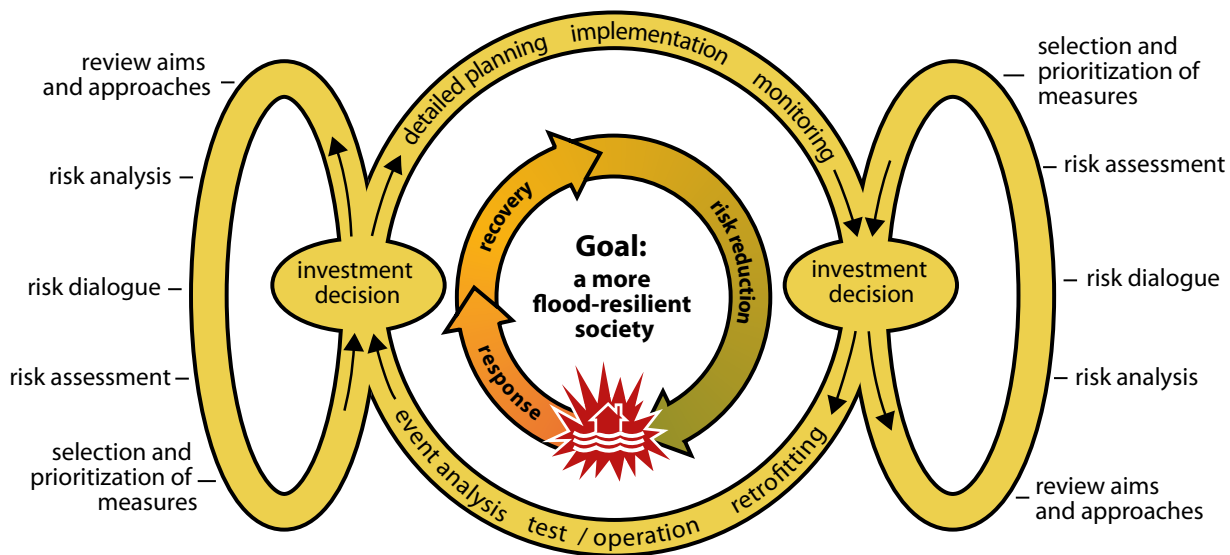
order to minimise damage to property and the environment. Planning mistakes have to be corrected. With regard to this, amongst other things the role and feasibility of resettlements have to be clarified.

- ▶ **Cross-border and interdisciplinary cooperation:** Since conventional wisdom tells us that flooding doesn't stop at countries' borders and its impact is not confined to specific sectors, measures for reducing risk and coping with the event have to be coordinated between various specialists and administrative areas. The fields where cooperation is necessary have to be systematically identified and clearly anchored in flood risk management plans. This particularly applies to methods for prioritising risk reduction measures, and also requires strong coordination between institutions within the river basins.
- ▶ **The role of the general public:** On the one hand potentially affected persons should inform themselves well and implement precautionary measures at their homes; on the other hand they are often involved too late regarding planning processes for flood protection systems. This inconsistency is to be resolved by a risk dialogue on an equal footing, to above all enable local interests, experiences and knowledge to be integrated into locally-adapted strategies to reduce risk. Furthermore, binding regulations are to be established for incorporating a mechanism for taking into consideration the results of such a dialogue in the planning process. To enhance coping capacities, concepts for involving voluntary helpers during events have to be developed.
- ▶ **Transparent risk transfer system:** The current coexistence of elementary damage insurance and ad-hoc decisions on government reconstruction aid provides little incentive for self-provision, even if government aid in the case of smaller events is not granted to the same extent and insured households are more

reliably and quickly compensated than uninsured. Therefore, ad-hoc decisions for reconstruction aid are to be replaced by a transparent, nationally consistent risk transfer system, which takes into consideration the current form of elementary damage insurance and enables the improvement of precautionary measures as part of the reconstruction approach.

And the following continues to apply: floods are natural events, but damage incurred by flooding is not. Therefore risk drivers, such as climate change, land use changes, economic developments or demographic change and the resultant risks must be investigated at regular intervals, risk reduction strategies and processes must be reassessed as well as adapted and implemented in a dialogue with all stakeholders as proposed in the figure below.

The recurring flood events show that flood risk management is a continuous task and at the same time a complex issue that requires personnel and institutional continuity. The available resources are often unable to keep up with these demands and must be upgraded in order to permanently anchor risk management in thinking and action.



Expanded cycle of flood risk management.

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