Bündnis
Entwicklung Hilft

Brot für die Welt · welt hunger hilfe · terre des hommes Hilfe für Kinder in Not · medico international · MISEREOR IHR HILFSWERK

Focus: Governance and civil society

WorldRiskReport 2011

In cooperation with:

UNITED NATIONS UNIVERSITY

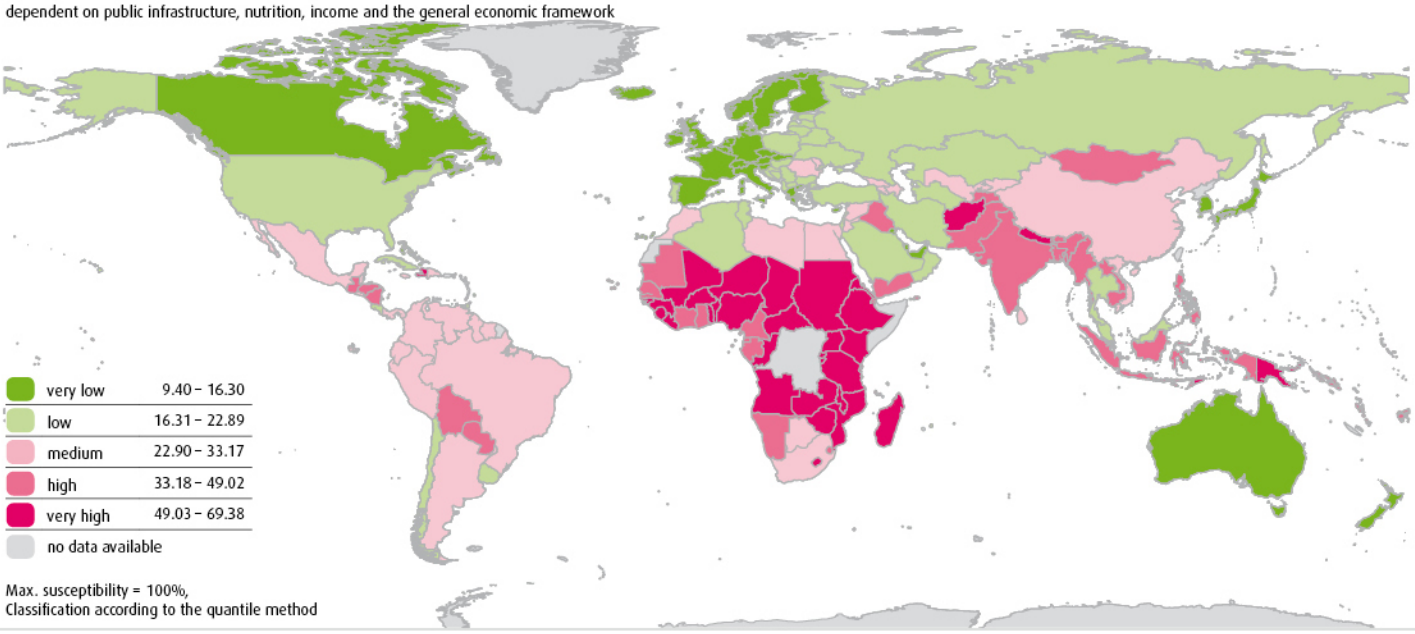
UNU-EHS

Institute for Environment and Human Security

Together for people in need.

Susceptibility

dependent on public infrastructure, nutrition, income and the general economic framework



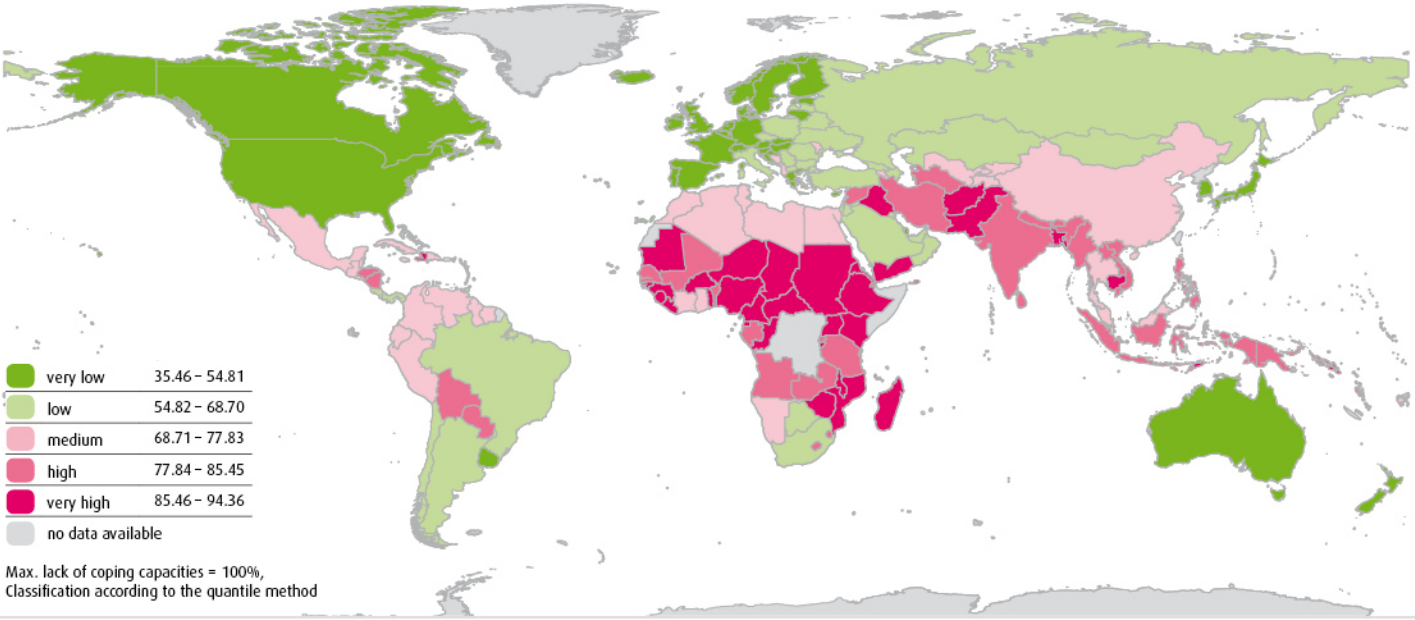
Max. susceptibility = 100%,
Classification according to the quantile method

Map B1

Map B2

Lack of coping capacities

dependent on governance, medical care and material security

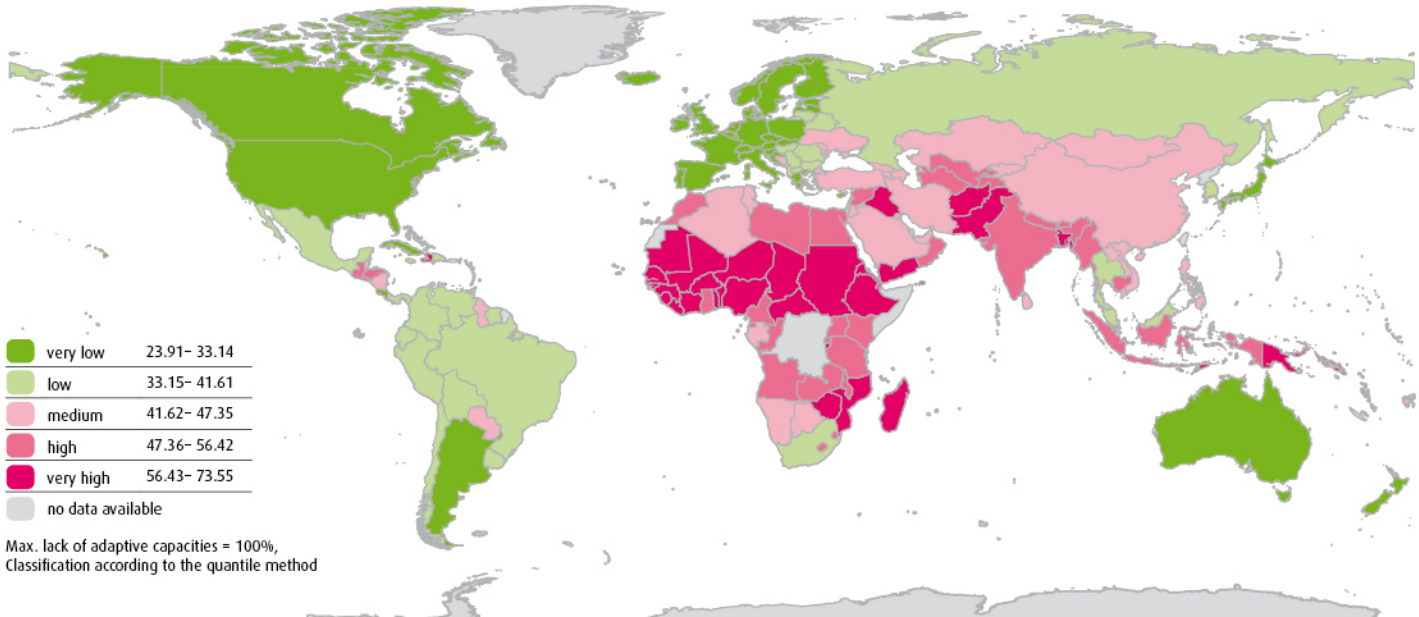


Max. lack of coping capacities = 100%,
Classification according to the quantile method

Map B3

Lack of adaptive capacities

related to future natural events and climate change

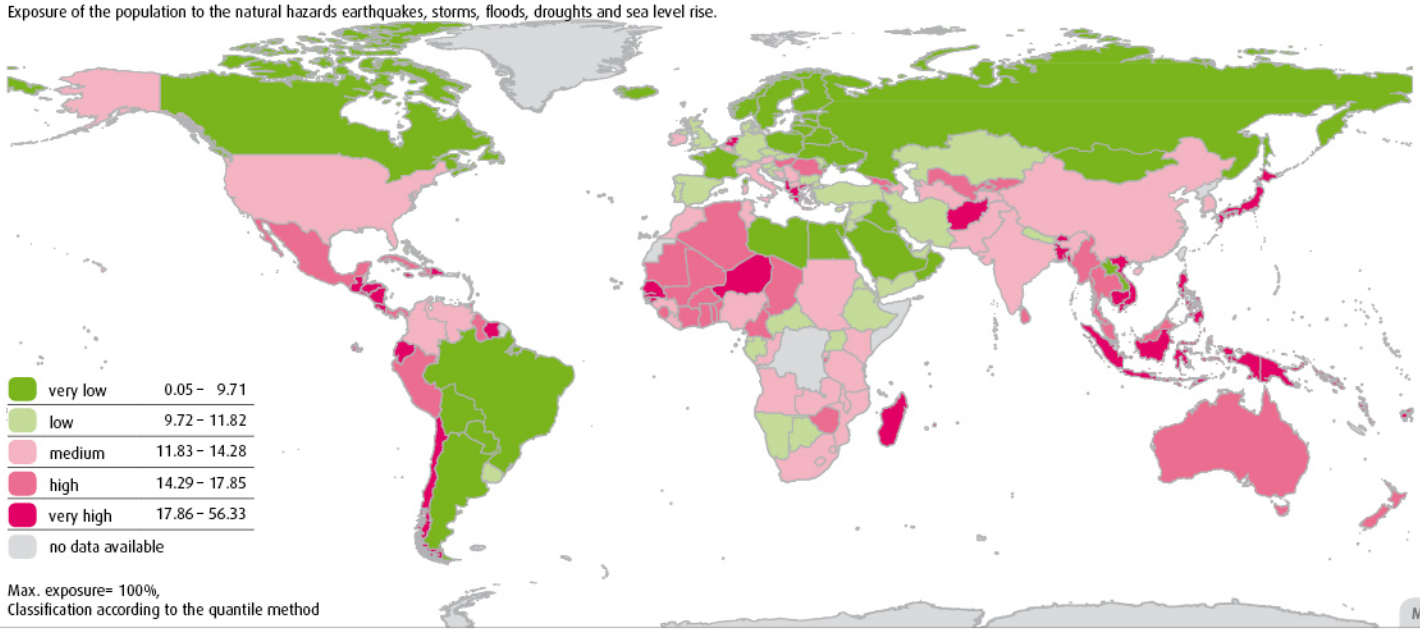


Max. lack of adaptive capacities = 100%,
Classification according to the quantile method

Data: Source UNU-EHS, based on the PREVIEW Global Risk Data Platform, CReSIS, CIESIN and global databases; detailed information at www.WeltRisikoBericht.de

Exposure

Exposure of the population to the natural hazards earthquakes, storms, floods, droughts and sea level rise.



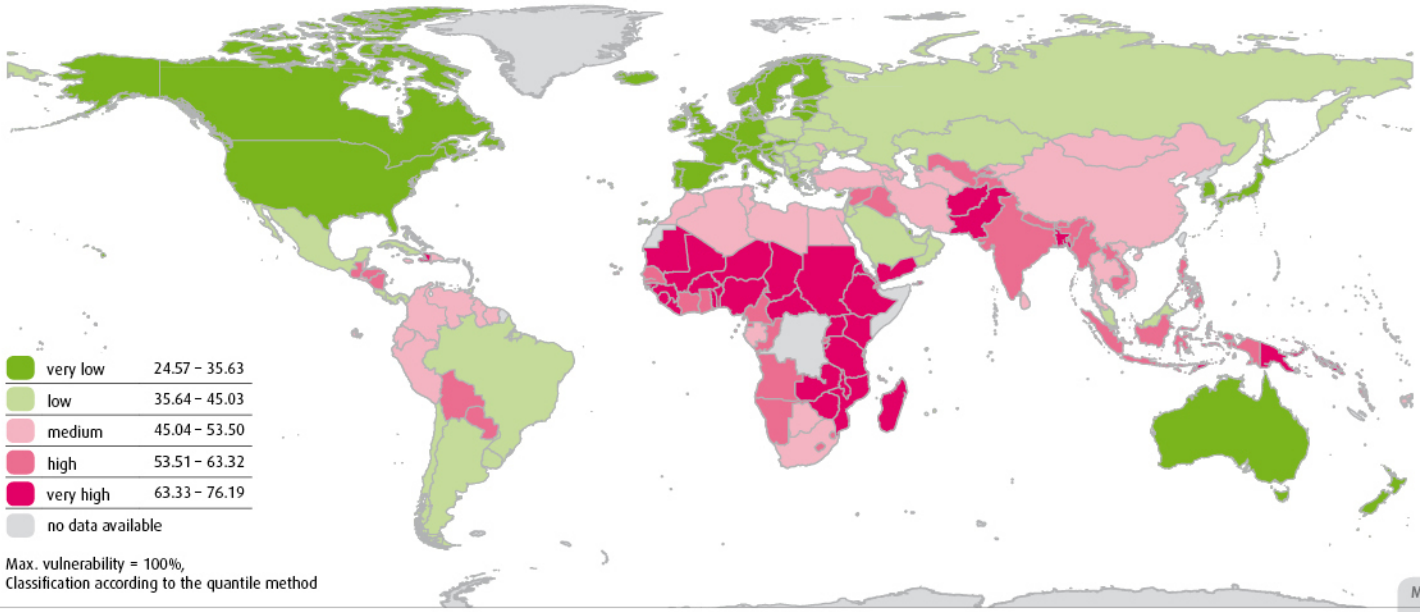
very low	0.05 – 9.71
low	9.72 – 11.82
medium	11.83 – 14.28
high	14.29 – 17.85
very high	17.86 – 56.33
no data available	

Max. exposure= 100%,
Classification according to the quantile method

Map A

Vulnerability

Vulnerability of society as the sum of susceptibility, lack of coping capacities and lack of adaptive capacities



very low	24.57 – 35.63
low	35.64 – 45.03
medium	45.04 – 53.50
high	53.51 – 63.32
very high	63.33 – 76.19
no data available	

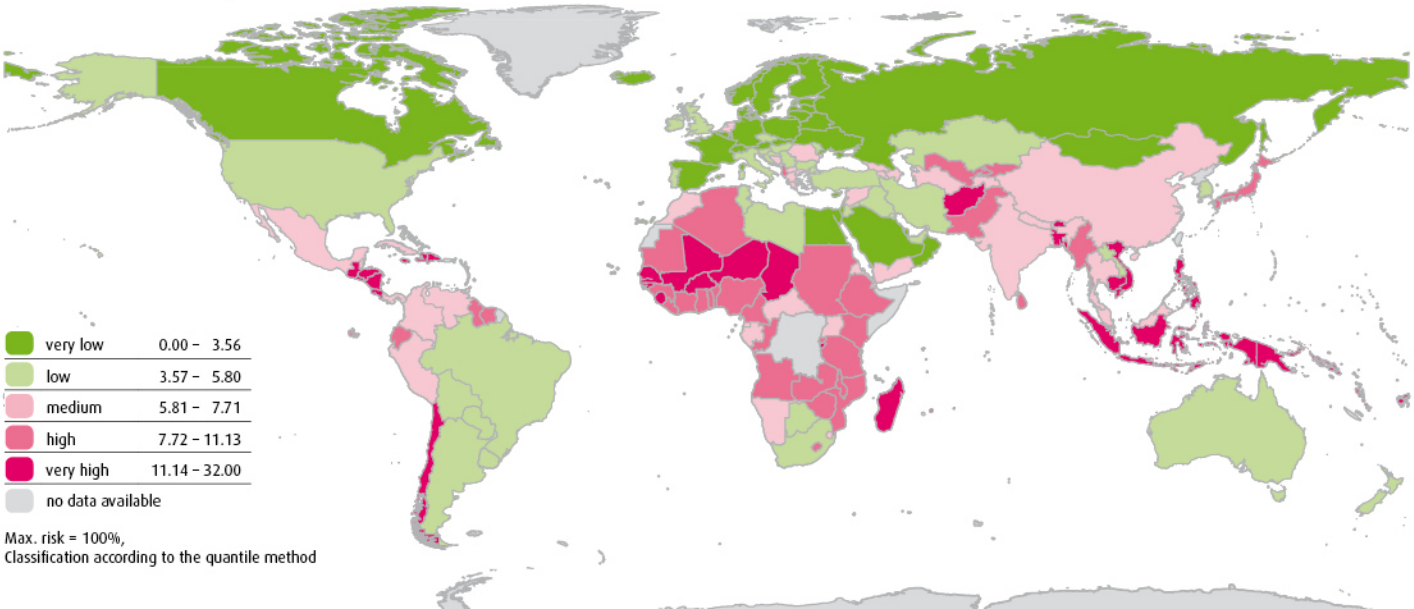
Max. vulnerability = 100%,
Classification according to the quantile method

Map B

Map C

WorldRiskIndex

WorldRiskIndex as the result of exposure and vulnerability



very low	0.00 – 3.56
low	3.57 – 5.80
medium	5.81 – 7.71
high	7.72 – 11.13
very high	11.14 – 32.00
no data available	

Max. risk = 100%,
Classification according to the quantile method

Data: Source UNU-EHS, based on the PREVIEW Global Risk Data Platform, CReSIS, CIESIN and global databases; detailed information at www.WeltRisikoBericht.de

WorldRiskReport 2011

1. The WorldRiskReport

People are inevitably captivated by disasters. Television, online media, social networks and newspapers report immediately from affected areas. In just the first three months of 2011, the earthquake in New Zealand, the flood in Australia, and in particular, the earthquake and tsunami in Japan provided shocking images. Extreme natural events such as the tsunami on Boxing Day 2004 as well as the earthquake in Haiti and the flood in Pakistan both in 2010 have had catastrophic effects on the affected regions. The frequency and intensity of such extreme events have increased alarmingly in recent years. But did the disaster risk also increase?

Whether an earthquake or a tsunami, a hurricane or a flood, the risk that a natural event will develop into a disaster depends only partially on the strength of the event itself. A substantial cause lies in the living conditions of people in the affected regions and the opportunities to quickly respond and help. Those who are prepared and who know what to do during an extreme natural event have higher survival chances. The countries that anticipate natural hazards prepare for the consequences of climate change and provide the necessary financial resources are better equipped for the future.

The *Bündnis Entwicklung Hilft* (Alliance Development Works) publishes the WorldRiskReport to examine these issues at the global level and to draw conclusions for future actions in assistance, policy and reporting. The core of the WorldRiskReport is the WorldRiskIndex, which was developed on behalf of the *Bündnis Entwicklung Hilft* by the United Nations University Institute for Environment and Human Security in Bonn, Germany. The WorldRiskIndex indicates the probability that a country or region will be affected by a disaster. The index is the result of close cooperation between scientists and practitioners. Experts in the analysis of natural hazards and vulnerability research as well as practitioners of development cooperation and humanitarian aid have discussed and developed the concept of the index. Globally available data are used to represent the disaster risk for the countries concerned.

In the framework of the WorldRiskIndex, disaster risk is analysed as a complex interplay of natural hazards and social, political and environmental factors. Unlike current approaches that focus strongly on the analysis of the various natural hazards, the WorldRiskIndex, in addition to exposure analysis, focuses on the vulnerability of the population, i.e. its susceptibility, its capacities to cope with and to adapt to future natural events as well as the consequences of climate change. Disaster risk is seen as a function of exposure and vulnerability. The national states are the frame of reference for the analysis.

WorldRiskIndex: Searching for protection

The WorldRiskIndex seeks answers to the following questions:

+ **How likely is an extreme natural event and will it affect people?**
+ **How vulnerable are people to natural hazards?**
+ **To what extent are societies able to cope with severe and immediate disasters?**
+ **Does society take precautionary measures against anticipated future natural hazards?**

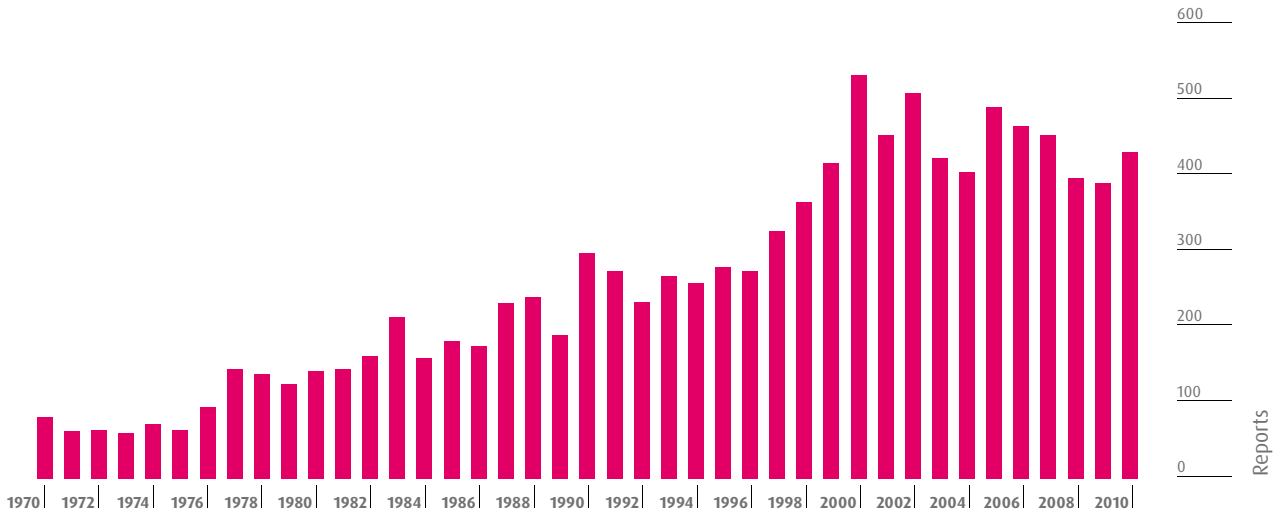
The index consists of indicators in four components: **exposure** to natural hazards such as earthquakes, storms, floods, droughts and sea level rise; **susceptibility** as a function of public infrastructure, housing conditions, nutrition and the general economic framework; **coping capacities** as a function of governance, disaster preparedness and early warning, medical services, social and economic security; and **adaptive capacities** to future natural events and climate change.

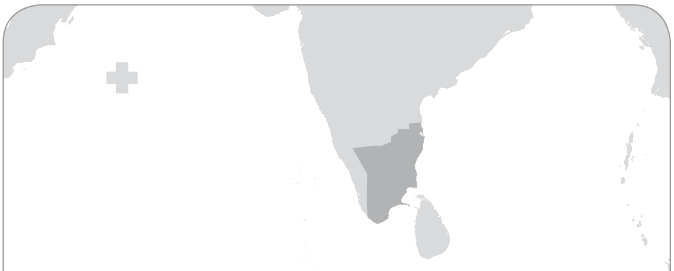
There is a fine line between the components; some adaptive measures, for example, directly lead to a decrease in individuals' susceptibility or to an increase of coping capacities. In the approach of the WorldRiskIndex, new aspects are included, for which no global database currently exists: national disaster preparedness policy, social networks, urban and spatial structure and national adaptation strategies. Again, this is the result of close cooperation between scientists and practitioners: high relevance categories for major disasters are included in the index, even if the relevant scientific data are not yet globally available. This provides the opportunity to directly implement current developments and integrate new knowledge in the WorldRiskReport: indeed, as soon as confirmed data are globally available, they can be integrated into the index: the structure consisting of four components with several sub-categories that make up the general index as mathematically linked modules makes this possible. Also, variables that have not yet been identified for assessing disaster risk can be integrated when needed and used to develop the WorldRiskIndex.

This report thus contributes to both identifying the aspects that urgently require research in order to better understand and evaluating the interaction between natural hazards and the affected society. Combined with the modular structure of the WorldRiskIndex, this process allows for the continuous improvement of the present risk analysis in the coming years.

The WorldRiskIndex is complemented by a local risk index with a small-scale analysis that provides important information for practitioners. More data are often available

Figure 1: Total number of reported natural disasters, 1970–2010
(Data: CRED EM-DAT 2011)





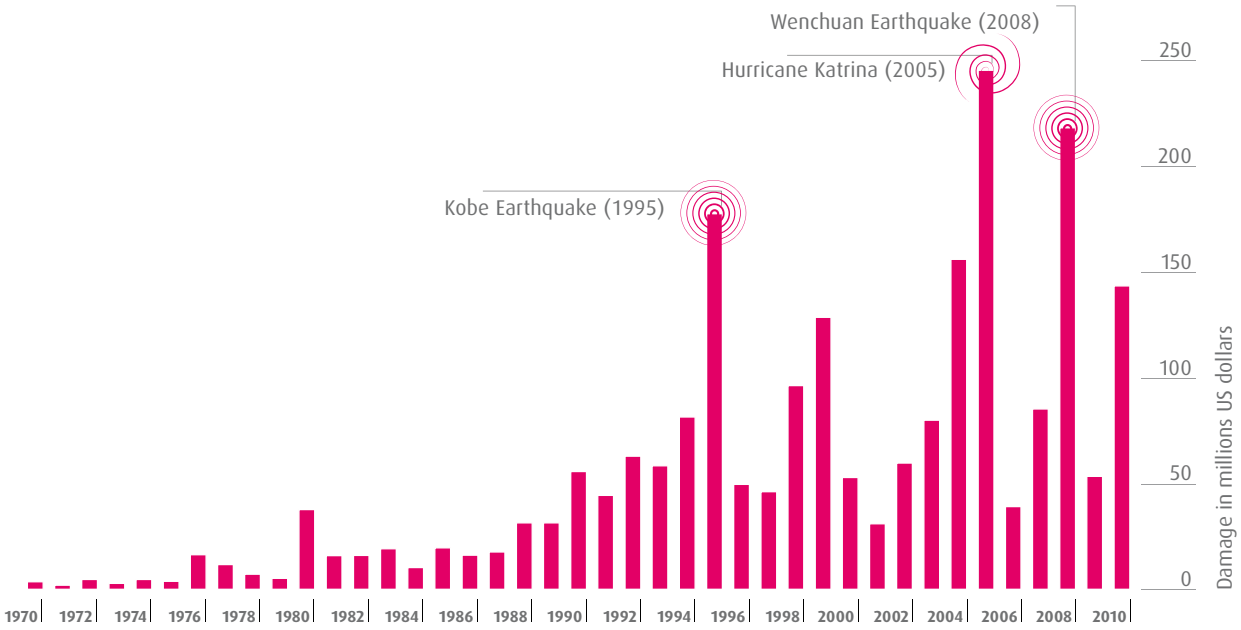
Concretely facing natural hazards

In the Indian Federal State of Tamil Nadu, fishers use mobile phones with Internet connection before leaving for fishing. The latest weather report is retrieved and thus contributes to early warning and ideally to a well-adapted behaviour. Other measures for facing hazards include those supported by the members of the Alliance in their project work: traditional building methods such as construction on stilts in areas with recurring floods, earthquake-resistant houses constructed of timber or clay, and earth walls protecting fields in flood risk areas.

at the regional or local level, and can be of interest for risk assessment. For instance, the members of the *Bündnis Entwicklung Hilft* also carry out risk analyses in their project work. Data resulting from these analyses – ideally with the help of scientists – can be incorporated into the modules of the WorldRiskIndex, as shown in the WorldRiskReport 2011 with the example of several administrative units in Indonesia. The result is an index of high practical value.

Each global report has limitations in its validity. This also applies to the WorldRiskIndex: data on mutual neighbourhood assistance, traditional structures and self-help capacities are not available in a global comparison, unlike, for example, the number of hospital beds or per capita income. As a consequence, social factors are included to a lesser extent in the WorldRiskIndex than easily measurable technical or economic factors. This must be kept in mind when drawing conclusions for risk assessment; however, it also provides the opportunity to request a better analysis of these factors from policy and science.

Figure 2: Estimated damage caused by natural disasters, 1970–2010
(Data: CRED EM-DAT 2011)



The focal topic of the WorldRiskReport 2011 is governance and civil society. Three subchapters concentrate on the complex interaction of state responsibility and potential influences of civil society, viewed from the standpoint of practitioners. In addition to discussing the risk of weak governance with respect to disasters, they also examine the unintended side effects of external interventions (e.g. the risk of further undermining already weak governments) and the possibilities of civil society to call for government action, as well as to support and supplement it. The basic chapters examining these issues are supplemented by country-specific case studies that explain the operations and principles of the members of the *Bündnis Entwicklung Hilft* at the interface between disaster risk reduction and the promotion of good governance.

The aim of the WorldRiskReport 2011 is to shift away from the usually short-term view of disasters and concentrate on a developmental approach, focusing on aspects such as prevention, protection of particularly vulnerable groups and risk management.

Linking the social and economic dimensions of risk with the classical risk analysis of natural events will allow a new approach to risk assessment and enable forward-looking conclusions for both decision-makers and practitioners. Precautionary measures to minimize risks should be mentioned here as well as climate change adaptation.

Japan – The incalculable risk of nuclear energy

The severe earthquake in Japan in the spring of 2011 and the subsequent nuclear meltdown prove that even the countries that perform well in the WorldRiskIndex in the categories of susceptibility, coping capacities and adaptive capacities, cannot cope with all disasters – i.e. when uncontrollable risks are known, assessed incorrectly or even tolerated. In this case, even the most stable framework conditions are not adequate for the management of the disaster. Once radioactivity is released into the environment, it is not only dangerous across borders but it is also impossible to control, even in a highly industrialized country. In this case, risk reduction would entail rejecting the nuclear option for energy production and the consistent implementation of sustainable energy production. If the complex disasters in Japan (earthquake, tsunami and nuclear meltdown) had struck a less developed country, the material damage would have been far higher and far more people would have been affected by the earthquake and meter-high tsunami waves. In view of the nuclear meltdown that may possibly affect millions of people, this fact must be put into perspective, however.

The aim of the *Bündnis Entwicklung Hilft* is to jointly consider relief aid and development cooperation, and to link them more closely in practice. Risk assessment, prevention, coping and adaptation strategies are the components of this concept. The index and the indicators can help to be selectively active in anticipation of extreme natural events and to prioritize preventive measures. In early 2005 the non-governmental organizations (NGOs) Brot für die Welt, Medico International, Misereor, Terre des Hommes and Welthungerhilfe founded the alliance whose mission is to actively provide on-site emergency and long-term help in emergencies and disasters. After the tsunami in Southeast Asia, the cyclone Nargis in Myanmar, the earthquake in Haiti and the flood in Pakistan in 2010, and many other cases, the members of the *Bündnis Entwicklung Hilft* joined forces. The *Bündnis Entwicklung Hilft* is active in public relations in Germany, informing on the causes of disasters as well as on ways of disaster prevention.

The printed version of the WorldRiskReport is published for easy readability. Maps, graphs and images supplement the text. The underlying detailed scientific explanation, further information and tables are available for further reading and can be downloaded at www.WorldRiskReport.org.

The results at a glance

The results of the index show that there is a very high desater risk (see table at the right), particularly for Asian and Latin American countries – including the Philippines, Bangladesh, Timor-Leste, Cambodia, Guatemala, Costa Rica and El Salvador. It is also striking that three island nations, Vanuatu, Tonga and the Solomon Islands, are among the 15 countries with the highest disaster risk, Vanuatu being the country with the highest risk. Breaking down the collected data, it appears that this fact is mainly due to the extremely high exposure of these countries. Indeed, in terms of social factors (vulnerability), these countries compare significantly better than many others. In this respect, the coping and adaptive capacities of these countries are not yet sufficient to substantially reduce the disaster risk. However, the examples of Japan, Chile and the Netherlands, all belonging to the 15 countries with the highest exposure, show that good disaster preparedness in view of the development of coping and adaptive capacities can significantly reduce the disaster risk. These three countries are ranked 35th, 25th and 69th, respectively, in the WorldRiskIndex. With respect to vulnerability, which consists of the categories of susceptibility, coping capacities and adaptive capacities, Afghanistan has the worst performance, which is followed by eight African countries – including for example Niger, Chad, Sierra Leone, Eritrea – and then Haiti, which ranks on position 10.

WorldRiskIndex

Rank	Country	Risk (%)
1	Vanuatu	32.00
2	Tonga	29.08
3	Philippines	24.32
4	Solomon Islands	23.51
5	Guatemala	20.88
6	Bangladesh	17.45
7	Timor-Leste	17.45
8	Costa Rica	16.74
9	Cambodia	16.58
10	El Salvador	16.49
11	Nicaragua	15.74
12	Papua New Guinea	15.45
13	Madagascar	14.46
14	Brunei Darussalam	14.08
15	Afghanistan	14.06
150	Germany	2.96
159	Canada	2.57
160	Switzerland	2.55
161	Barbados	2.44
162	Egypt	2.38
163	Grenada	2.29
164	Norway	2.28
165	Estonia	2.25
166	Finland	2.06
167	Sweden	2.00
168	Kiribati	1.88
169	Bahrain	1.66
170	Iceland	1.56
171	Saudi Arabia	1.26
172	Malta	0.72
173	Qatar	0.02

2. WorldRiskIndex: Concept and results

Jörn Birkmann, Torsten Welle, Dunja Krause, Jan Wolfertz, Dora-Catalina Suarez, Neysa Jacqueline Setiadi

What is society's risk of becoming the victim of natural hazards and climate change? The WorldRiskIndex provides an illuminating response. The United Nations University Institute for Environment and Human Security in Bonn calculated a risk score for 173 countries throughout the world. Accordingly, with a value of 32.00 per cent, the disaster risk is highest for the Pacific island state of Vanuatu. This index value is calculated by combining the exposure to natural hazards with the vulnerability of a society, which in turn combines its susceptibility and its coping and adaptive capacities.

Figure 3: Scheme of the concept of the WorldRiskIndex

2.1 Objective

The concept of the WorldRiskIndex is based on the core understanding of risk within the natural hazards and disaster risk reduction community. In this context, risk is defined as the interaction between a natural hazard event (earthquake, flood, storm, drought, sea level rise) and the vulnerability of the exposed element or society (UN/ISDR 2004; Wisner et al. 2004; Birkmann 2006; IDEA 2005). Vulnerability includes social conditions and processes in terms of susceptibility as well as coping and adaptive capacities. The adaptive capacity is included in the index as a separate component, in addition to coping capacity. The adaptive capacity refers to long-term strategies for change within a society, while coping capacities deal with resources for a direct response to the impact of a given hazard event.

The concept of the WorldRiskIndex stresses that risk is essentially determined by the structure, processes and framework conditions within a society that can be affected by natural hazards, as well as the exposure to natural hazards and climate change. In contrast to the assumption that a well-ordered society faces natural hazards and climate change, the concept of the WorldRiskIndex particularly underlines the importance of social, economic and environmental factors as well as governance aspects in determining whether a natural hazard will result in a disaster. The WorldRiskIndex is recorded and measured on the basis of four components (Figure 3):

+ **Exposure to a natural hazard or a climatic stimulus**
+ **Susceptibility**
+ **Coping capacities**
+ **Adaptive capacities.**

While the calculation of exposure to a natural hazard yields the number of people exposed to a possible natural hazard, the other three components (susceptibility, coping capacities and adaptive capacities) focus on characteristics of vulnerability of societies and social actors. As part of a global system of indicators, however, only selected aspects can be highlighted. They must be supplemented by additional local and context-specific studies.

Overall, the approach of the WorldRisk-Index was developed on the basis of different views in the scientific discourse to vulnerability and risk. Other indices that try to map risk and vulnerability at the global level are often strongly focused on issues of exposure, casualties caused by disasters and economic losses (For a detailed description of the study, see www.WorldRiskReport.org.) The scientific basis of the WorldRiskIndex relies on framework concepts, which seek an integrative and holistic coverage of vulnerability within a process model and is based in particular on the work of Bogardi and Birkmann (2004), Cardona (1999, 2001) and Birkmann (2006). In addition, discussions on the distinction between coping and adaptive capacities were recently initiated (see, inter alia, Davies 2009; Birkmann 2011).

Vulnerability and vulnerability assessment generally relate to the identification of factors (such as social, physical, economic and environmental factors) that, on the one hand, render people or systems susceptible to impacts resulting from natural hazards and climate change, and on the other hand, describe their capabilities and capacities to cope with and adapt to adverse impacts of natural hazards. Vulnerability and hence the susceptibility, coping capacities and adaptive capacities of people and systems, however, are not static but are subject to strong dynamics. At times, susceptibility, coping capacities and adaptive capacities can be distinguished between the phases – before, during and after – a disaster (Wisner 2002, Birkmann and Fernando 2008). As part of the WorldRiskIndex, these dynamics can only be covered in a limited way; in particular, a continuous updating of the index would make it possible to systematically document some of these dynamics.

2.2 Four components

The abstract concepts of risk, exposure and vulnerability are specified in the study on the basis of exposure to natural hazards or potential phenomena of climate change, susceptibility, coping capacities and adaptive capacities. It should be clearly pointed out that the WorldRiskIndex does not attempt to cover all facets of risk, exposure and vulnerability; rather, it aims at providing an overview of important key components of risk at global level. The distinction between coping and adaptive capacities is a new item that should show that countries and different social groups may have short-term capacities to avert damage caused by a natural event (coping capacity), but nevertheless it must also be considered which capacities are available for long-term and permanent change that would enable adaptation to environmental and societal change. Accordingly, great emphasis is put on the intrinsic, logical combination of the individual indicators in the context of the four components exposure, susceptibility, coping capacities and adaptive capacities.

Exposure

Exposure in its core meaning in natural hazard research refers to entities exposed and prone to be affected by a hazard event. These entities include persons, resources,

infrastructure, production, goods, services or ecosystems and coupled social-ecological systems.

Exposure can thus be differentiated into a temporal and spatial component. If a society or a country has no exposure to natural hazards, then the development of strategies for dealing with them can be neglected. Within the WorldRiskIndex, exposure is related to the potential average number of individuals who are exposed each year to earthquakes, storms, droughts and floods (see Peduzzi et al. 2009). Added to this number are people who would be affected by the sea level rising by one meter. It should be taken into consideration in the calculation that a potential rise of the sea level by one meter is expected to occur only by 2100 and in a gradual process. The base of the index is, however, the population in 2005 and not the projected population in the future. Despite these methodological difficulties, it is important to carefully consider these slow environmental changes in the context of climate change in future risk studies.

The WorldRiskIndex is designed with a focus on the natural hazards that occurred from 1970 to 2005, which were responsible for most of the human casualties and material damage (CRED EM-DAT 2011), in addition to the consideration of the potential threat of a continuing rise of the sea level. The following five natural hazards were therefore selected:

+ Earthquakes
+ Storms
+ Floods
+ Droughts
+ Sea level rise.

Susceptibility

Susceptibility refers to selected structural characteristics of a society and the framework conditions in which the social actors face potential natural hazards and climate phenomena. In this regard, the nutritional and the economic situation as well as the condition of infrastructures are particularly important. These characteristics render it possible to make provisional assumptions on the relative susceptibility of societies compared to other societies.

Generally, susceptibility is understood as the likelihood of suffering harm and damages in case of the occurrence of a natural hazard. Conceptually, susceptibility has been separated into sub-categories that reflect the living situation and conditions of people within a country:

+ Public infrastructure
+ Housing conditions
+ Nutrition
+ Poverty and dependencies
+ Economic capacity and income distribution.

Coping

Coping and coping capacities include the capacities of societies and exposed elements (such as systems and institutions) to minimize the negative impact of natural hazards and climate change through direct action and resources. Coping is therefore based on the direct effects of natural hazards and climate change. According to the concept of the WorldRiskIndex, coping includes available abilities and capacities that may be highly relevant for minimizing damages in the occurrence of a hazardous event. The following five sub-categories were chosen to characterize the component:

+ Government and authorities
+ Disaster preparedness and early warning
+ Medical services
+ Social networks
+ Material coverage.

Based on the definitions of susceptibility and coping, it can be seen that both components

are closely interlinked, and that a clear separation in practice is thus often impossible. Nevertheless, it is important to emphasize and communicate that societies are prone to natural hazards, yet are capable to handle them.

Adaptation
Adaptation includes capacities, measures and strategies that enable communities to change in order to address expected negative consequences of natural hazards and climate change. It implies that a society has already changed before the occurrence of negative effects in such a way that coping is no longer necessary to the extent that it had been in the past. In contrast to coping capacities, adaptive capacities and measures are strongly aimed at the transformation of current structures (education, status of the environment, etc.). Adaptation focuses primarily on capacities that can trigger the appropriate changes.

The following five sub-categories were identified within this concept. In a wider sense, they may be responsible in the long term to make societies more resistant and adaptable to the impact of climate change and natural hazards:

+ Education and research
+ Gender equity
+ Environmental status/ecosystem protection
+ Adaptation strategies
+ Investments.

2.3 Data and methods

This chapter provides an overview of the selected indicators, the available global data sets and the calculation of the WorldRisk-Index and its components. The implementation of the concept for the WorldRiskIndex is based on freely available global data, which must meet certain standards and quality criteria. For the global and the local level under consideration, it was decided to base the analysis on the following quality criteria: the exposure indicators make it possible to compare the different natural hazards; the indicators of susceptibility, coping capacities and adaptive capacities should be general in order to be equally relevant to all kinds of natural hazards. These indicators reproduce the intended theoretical facts (indicandum); the indicators are statistically and analytically accurate, reproducible, comparable, understandable and as simple as possible to interpret (see Meyer 2004). In addition, most of the data used should be collected regularly to facilitate future updates of the indicators and, in particular, in order to represent development processes.
As part of the development of the World-RiskIndex, different methodologies were used (statistical and spatial analysis using geographic information systems), which could be followed up in the technical annex to this study. For example, a factor analysis was conducted to validate the structure of the overall index (Figure 8). For the spatial analysis and the mapping, the values of the calculated indices were separated into five classes using the quantile classification method, which is integrated in the ArcGIS 9.3 software.
Thereby each class contains an equal number of features. The five classes of all calculated indices differ in their value ranges, but can also be translated into the qualitative classifi-

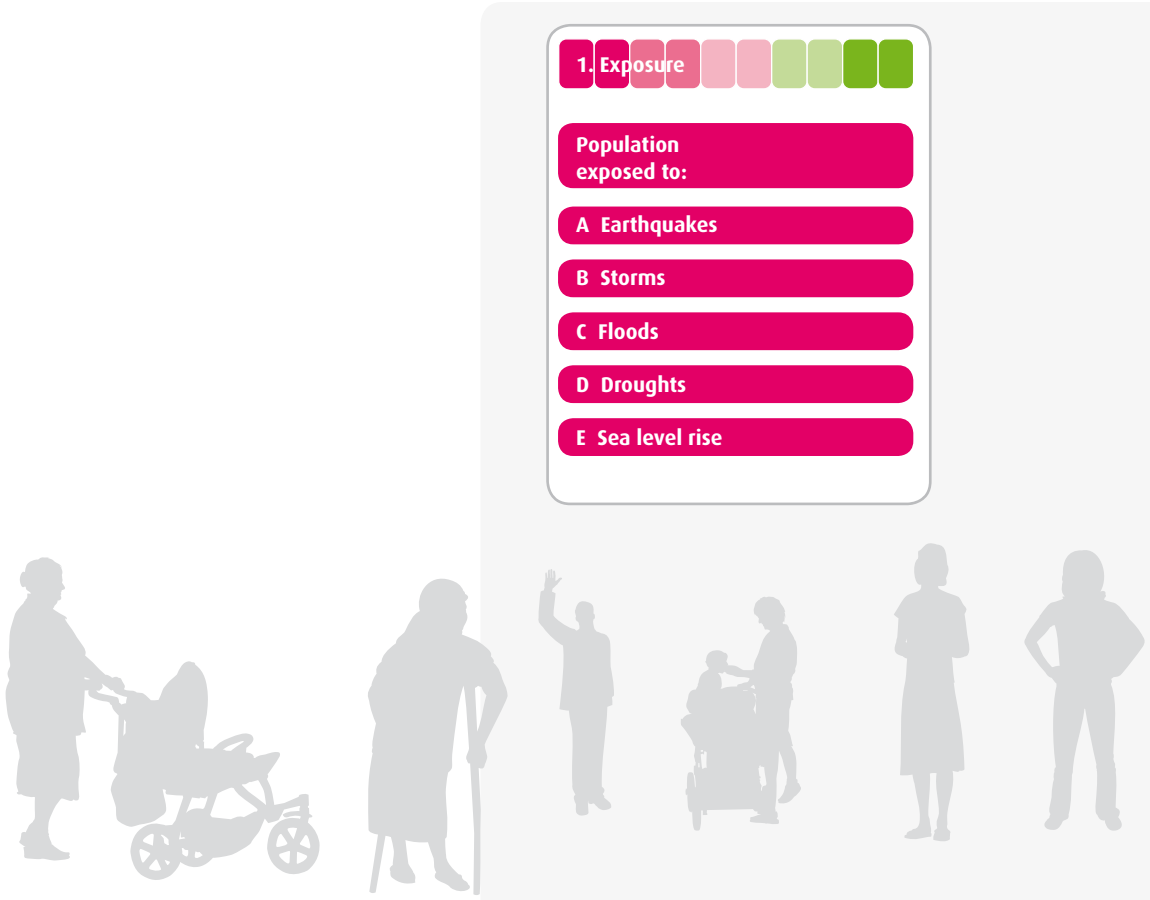


Figure 4: Indicators of the four components of the WorldRiskIndex

cation of "very high – high – medium – low – very low" (see the maps on the fold-out pages of the cover).

As a whole, the authors believe that the individual components of exposure and vulnerability are more relevant for communication and decision-making than the aggregate total index, since an aggregation always entails a loss of differentiation.

Indicators

The WorldRiskIndex is calculated using appropriate indicators in the four components of exposure, susceptibility, coping capacities and adaptive capacities. Figure 4 shows the indicators and their respective division in the relevant components and sub-categories. The four sub-categories – housing situation, social networks, disaster preparedness/ early warning and adaptation strategies – are marked in grey because, although they are an important component of the index from a theoretical and practical point of view, they have not yet been integrated into the overall calculation of the WorldRiskIndex due to lack of relevant data. All four sub-categories are described in a separate box. The selection of the indicators relates, among other things, to aspects of the eight Millennium Development Goals and the Hyogo Framework for Action of the United Nations.

The raw data of all selected indicators were extracted from various global databases and due to the subsequent mathematical aggregation into indices transformed in dimensionless rank levels between 0 and 1. Figures 5, 6 and 7 show the modular structure of the indices for the susceptibility, coping capacities and adaptive capacities, respectively. They will be aggregated in each case into an index according to the above-mentioned weighting factors and converted into percentage values for better comprehension.

A detailed description of each indicator with its source is available at: www.WorldRiskReport.org

2. Susceptibility

Public infrastructure

- A Share of the population without access to improved sanitation
- B Share of the population without access to an improved water source

Housing conditions

Share of the population living in slums; proportion of semi-solid and fragile dwellings

Nutrition

- C Share of population undernourished

Poverty and dependencies

- D Dependency ratio (share of under 15- and over 65-year-olds in relation to the working population)
- E Extreme poverty population living with USD 1.25 per day or less (purchasing power parity)

Economic capacity and income distribution

- F Gross domestic product per capita (purchasing power parity)
- G Gini index

3. Coping capacities

Government and authorities

- A Corruption Perceptions Index
- B Good governance (Failed States Index)

Disaster preparedness and early warning

National disaster risk management policy according to report to the United Nations

Medical services

- C Number of physicians per 10,000 inhabitants
- D Number of hospital beds per 10,000 inhabitants

Social networks

Neighbors, family and self-help

Material coverage

- E Insurances (life insurances excluded)

4. Adaptive capacities

Education and research

- A Adult literacy rate
- B Combined gross school enrolment

Gender equity

- C Gender parity in education
- D Share of female representatives in the National Parliament

Environmental status / Ecosystem protection

- E Water resources
- F Biodiversity and habitat protection
- G Forest management
- H Agricultural management

Adaptation strategies

Projects and strategies to adapt to natural hazards and climate change

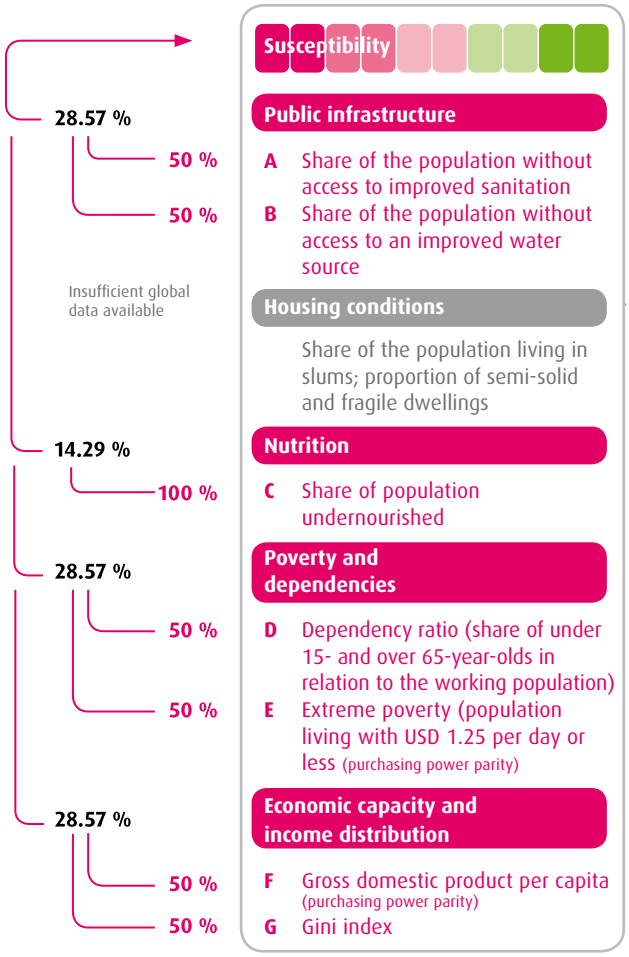
Investment

- I Public health expenditure
- J Life expectancy at birth
- K Private health expenditure

Exposure to natural hazards

The selection of hazards is based primarily on two factors: the authors chose the natural hazards that occurred most frequently from 1970 to 2005 and that claimed the most casualties (CRED EM-DAT 2011). The inclusion of other types of hazards, such as volcanic eruptions, mass movements (such as landslides) and forest fires, was seriously considered, but discarded due to the lack of suitable data and the relatively lower impact. Therefore, the WorldRiskIndex includes floods, storms, earthquakes and droughts, which, according to the United Nations International Strategy for Disaster Reduction (UN/ISDR, 2004) contribute to 74 per cent of all natural hazards. Moreover, in accordance with the International Disaster Database (CRED EM-DAT), these four natural hazards were responsible for 88 per cent of all deaths reported from 1970 to 2005. In addition, the future issue of global sea level rise was taken into particular consideration in order to include the threat to coastal areas and its residents in the context of climate change. Currently, about 13 per cent of the world's population lives in coastal areas that are less than ten meters above sea level (UN-Habitat 2011).

The WorldRiskIndex takes into account two different types of natural hazards: sudden-onset hazards such as storms, floods and earthquakes, and gradually or slowly occurring processes, such as drought and sea level rise. The data on exposure to earthquakes, storms, floods and droughts are taken from the Global Risk Data Platform PREVIEW of the United Nations Environment Programme (UNEP). The data records on physical exposure from this database include the number of persons per spatial unit of space (one square kilometer) who are exposed to the selected natural hazards on average per year and per country.



Excursus 1: Housing conditions
The housing condition is not included in the calculation of the index, but it must be considered an important component of susceptibility and therefore be mentioned within this component. There are data and methods available to study the housing situation, for example, by means of earth observation through remote sensing. This allows to estimate the building substance of individual houses and to analyse typical settlement patterns, such as in slum neighbourhoods (Taubenböck and Dech 2010). Since these studies are very time-consuming and cost-intensive, they have been carried out for only a few cities to date. As a result, there are no adequate data available to include these aspects at the global level.

Figure 5: Structure of the component susceptibility

The calculation of the potential exposure of people to global sea level rise by one meter is based on the records of the University of Kansas, Center for Remote Sensing of Ice Sheets (CReSIS). These were compared with a global population data set of Columbia University, Center for International Earth Science Information Network, using a geographic information system (GIS) and identifying the potentially exposed population per country. Subsequently, all individuals who were exposed to the five natural hazards (earthquakes, storms, floods, droughts and sea level rise) were added. Since the calculation of the number of exposed individuals (physical exposure) is highly complex for droughts and does not have the same accuracy (see Peduzzi et al. 2009) that can be achieved, for instance, for earthquakes, storms and floods, this indicator is only half-weighted. Similarly, the calculation of the exposed people to sea level rise by one meter is only half-weighted, since this is a gradual process and an annual average calculation of the exposure – as with other natural hazards – is not possible. Finally, all exposed people for each natural hazard are added and divided by the population of their country. Thus, the exposed population as a percentage for each country was calculated (see Map A on the right fold-out page of the cover).

Susceptibility

The susceptibility index is calculated in several steps. Figure 5 provides an overview of the indicators used to describe the susceptibility of societies and social groups at the national level with a global focus. In detail, the five sub-categories with their respective weighting factors can be observed. The housing situation has not been included in the calculation due to the lack of global data sets. The various indicators and their weighting factors are listed under each of the five

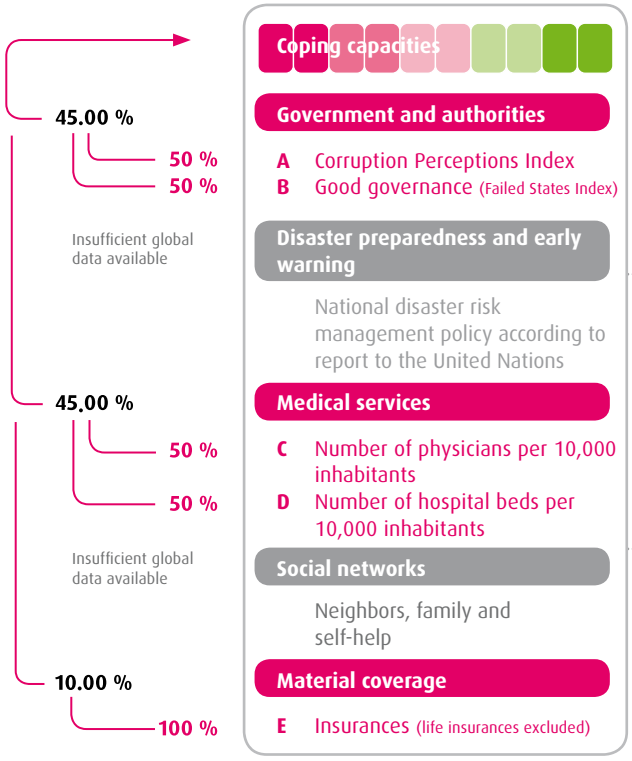


Figure 6: Structure of the component coping

Excursus 2: Disaster preparedness and early warning
This indicator gives a first impression of the current political processes and the implementation of disaster risk management activities within the Hyogo Framework for Action (HFA), which is designed for the 2005–2015 period. For the 2009–2011 period, there were 81 countries by the end of March that had submitted their progress reports on measures taken to safeguard against natural hazards and disasters. Within the WorldRiskReport, these reports were analysed with the help of a separate evaluation scheme in which a maximum of ten points could be achieved. Due to the relatively small number of countries, however, these values will not be included at this time in the calculation of the WorldRiskIndex. Disaster preparedness and early warning is nevertheless mentioned as a sub-category of coping capacity because of its great relevance for the component. The results of the evaluation are shown in Chapter 2.5 in a separate map (Figure 9).

Excursus 3: Social networks
Social networks can be a central resource for people exposed to natural hazards. They include mutual neighbourhood assistance, self-help groups, ties of kinship and networks which are effective in the case of an extreme event and contribute to mitigating the adverse effects should it occur. Social networks are extremely important in emergency situations playing a particular role in fragile or weak states, and contribute to assist the affected population (see Chapter 3.1). However, there are currently no reliable, meaningful global data available on social networks. They must be excluded from the calculation overall, but nevertheless must be listed under the coping component due to their high relevance.

sub-categories. The input data for the susceptibility indicators (A to G) have been converted into non-dimensional ranks with values between 0 and 1, as described above. It should be noted that the two indicators —"access to clean water" and "access to improved sanitation" — are positive in nature (see technical annex at www.WorldRiskReport.org). Accordingly, in order to determine the susceptibility of the population, the portion of people lacking access to clean water and improved sanitation has been calculated. The index for susceptibility is presented in Map B1 (on the left fold-out page of the cover).

Coping capacities

For calculating the lack of coping capacities index, indicators that contribute to reducing the negative impacts of natural hazards and climate change when they occur were selected. First, this index refers to the capacities that are important resources in the event of a disaster, such as medical services and material coverage. Second, it concerns framework conditions that make it difficult to cope with the direct effects of earthquakes, floods, storms, etc., both at the national level and at the level of individual population groups, such as corruption, poor governance, and lack of or inadequate social networks. Figure 6 provides a detailed overview of the indicators (A to E), their weighting and the classification into the five sub-categories. It should be noted, once again, that the sub-categories "disaster preparedness and early warning", and "social networks" could not be included due to their insufficient global database. For the calculation of the WorldRiskIndex, the coping capacities are not considered, but rather, the lack thereof, which is calculated as follows: 1 minus the coping capacity. The index for the lack of coping capacities can be seen as a cartographical representation on the left fold-out page of the cover (Map B2).

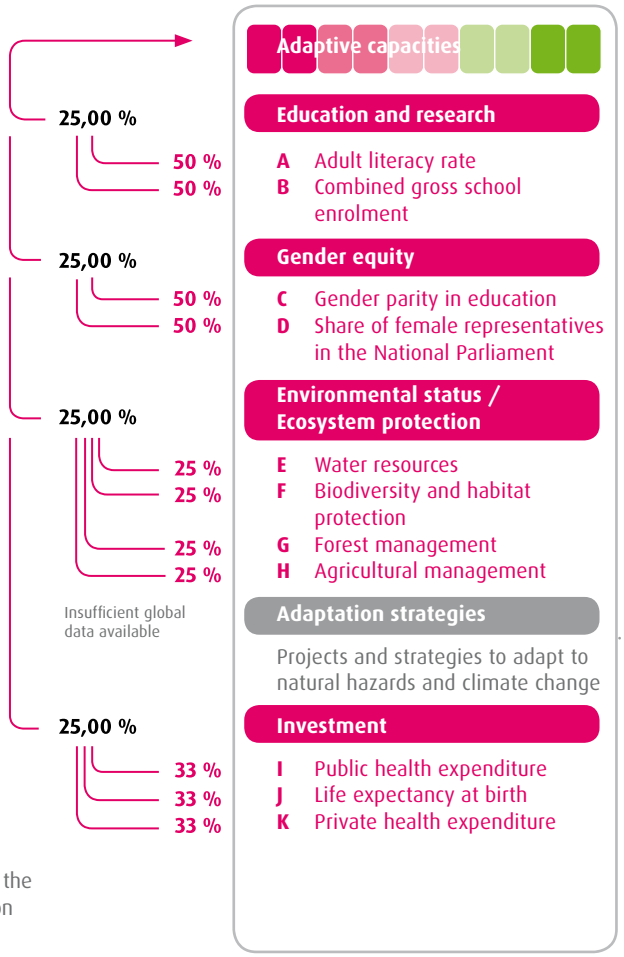


Figure 7: Structure of the component adaptation

Excursus 4: Adaptation strategies
This indicator describes, according to the approach of the WorldRiskIndex, the financial scope of previous adaptation projects under the National Adaptation Programmes of Action (NAPAs) under the United Nations Framework Convention on Climate Change (UNFCCC), which are available for 45 of the least developed countries (as per May 2011). The calculation is presented as the total volume of all adaptation projects per capita in a separate map (Figure 10).

Adaptive capacities

The index used for calculating adaptive capacities includes indicators that describe the capacities for long-term adaptation and transformation of societies and socio-ecological systems. The indicators (A to K), shown in Figure 7, were considered with their appropriate weightings. Once again, it was not possible to consider or evaluate all sub-categories for determining adaptive capacities due to difficulty in obtaining available data (Excursus 4). Therefore, the sub-category of adaptation strategies was not taken into account in calculating the adaptive capacities. Just as with the coping capacities, the lack of adaptive capacities was used in the overall calculation of the WorldRiskIndex. The presentation of the index for the adaptive capacities is shown in Map B3 printed on the left fold-out page of the cover.

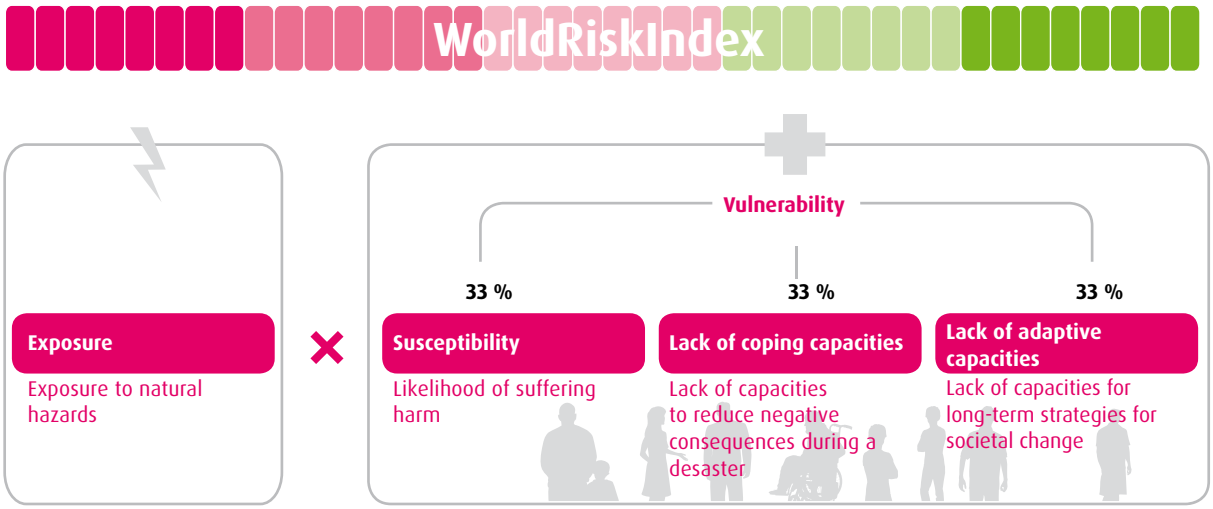


Figure 8: Structure of the Global index

Calculation of the WorldRiskIndex
As described above, each of the four components – exposure, susceptibility, coping capacities and adaptive capacities – is calculated individually. For an overview of vulnerability, susceptibility, lack of coping capacities and lack of adaptive capacities are at first aggregated into a vulnerability index. This vulnerability index is the societal risk component that can turn a natural event into a disaster. In the next step, the vulnerability is multiplied by the exposure to determine the risk. Figure 8 schematically shows the calculation formula, including equal weighting of the components of susceptibility, lack of coping capacities and lack of adaptive capacities, which leads to the overall result of the WorldRiskIndex. As part of the calculation of the WorldRiskIndex, the results have consistently been calculated with non-dimensional ranks with values between 0 and 1. To facilitate comprehension and for cartographic implementation, the vulnerability index and the WorldRiskIndex have been converted into percentages and are shown in Maps B and C (printed on the right fold-out page of the cover as well as in the centerfold of this report).

The technical annex with a detailed list of all indicators and a detailed description of the methodology of the WorldRiskIndex can be downloaded at www.WorldRiskReport.org.

2.4 Opportunities and limitations of the WorldRiskIndex

Creating indices and working with indicators usually have both advantages and disadvantages, which also apply to the WorldRiskIndex. Indicators and composite indices never give a perfect account of a theoretical concept – in this case, the concept of the WorldRiskIndex. The development of indices is ultimately a systematic and creative process, in which representative variables must be identified, calculated and evaluated to solve certain problems (Meyer 2004).

The advantage of an index is to reduce a complex situation to one total value, which allows grasping the current situation at one glance. Indices thus represent a valuable tool for communication and public relations, and can serve as a first basis for decision-making. The validity of indices, however, also has some serious limitations. The analysis of the WorldRiskIndex, both for the hazards and the social and economic components, can only give an overview. The following three limitations in the development of the WorldRiskIndex were of particular importance and shall be considered when assessing the validity of the index.

Level of abstraction
The consolidation into a single value means that the scope of the analysis is no longer visible. Therefore, for scientists and development cooperation practitioners, the individual index values of the four components and the local risk index, shown here in the Indonesian case study, are of great importance.

Data availability
The global WorldRiskIndex is dependent on data availability and quality, and could only be calculated for 173 out of 192 countries, since the current socio-economic data and data used to calculate the exposure are partially unavailable for some countries, incompatible or invalid. For this reason, many small island States, which are highly exposed to phenomena such as sea level rise could not be adequately considered. The reference year of the data used is also a limiting factor, since they were not available for all indicators of the same year. Recent developments are not considered in the data, for instance, the current political unrest in North Africa and in some Arab countries. The calculation of exposure is based on different databases, which refer to model calculations that may lead to some uncertainties. For calculating exposure to sea level rise, only the population at risk of a global sea rise level by one meter (within 100 years) was identified on the basis of population figures from 2005. Furthermore, not all data that should usefully be included in an index are globally available. Various aspects are mentioned in Chapter 2.3, which could thus not be integrated in the calculation.

Resolution
Many indices use data available at the national level. When considering governmental action, the nation is therefore relevant and is an important reference for the data of the WorldRiskIndex. But many national states have very different geographical areas. In a larger country such as Brazil, the United States of America, India or China, there is a greater likelihood that different regions have a different disaster risk. To solve this problem, the WorldRiskIndex was supplemented and amended by a local or regional level, so that the index could be adapted to the respective local context.

2.5 Risk assessment at the global level

The representation of the individual components of the WorldRiskIndex is aimed at illustrating specific aspects of exposure and vulnerability, and at visualizing them on the basis of globally available data. In this regard, the differences between the exposure of a country or society to natural hazards and climate change, on the one hand, and susceptibility, coping capacities and adaptive capacities, on the other hand, had to be clarified. The systematic classification and presentation of the items of the WorldRiskIndex thus emphasizes the importance of social framework conditions and the capacitiy to act of individuals and nations in terms of deciding on whether a natural hazard or climate change is liable to lead to a crisis or disaster.

A comparison between two disasters, the 2011 Tohoku earthquake in Japan and the 2010 earthquake in Haiti shows the importance of prevention and the difference in disaster management between two countries. In Japan, the disaster in March 2011 followed an earthquake and a tsunami, which then was followed by the technical failure at a nuclear power plant. These events partially exceeded the capacity for action of a highly industrialized country, highly exposed to the effects of natural hazards. However, while recent estimations assume approximately 28,000 fatalities due to the earthquake and subsequent tsunami in Japan with a magnitude of 9.0, the earthquake in Haiti in 2010 of magnitude 7.0 (which is 100 times weaker) caused more than 220,000 deaths (CRED EM DAT-2011). The comparison of the two disasters first shows the importance of disaster risk reduction, which saved many lives in Japan, and second, that a dangerous situation such as that of the Tohoku Earthquake would barely be manageable for a more vulnerable and less well-prepared developing country.

The individual components of the WorldRiskIndex are presented below. Starting with the exposure or respective proportion of the exposed population (see Map A on the cover pages), the description continues with the susceptibility (see Map B1 on the cover pages), the lack of coping capacities (see Map B2 on the cover pages) and the lack of adaptive capacities (see Map B3 on the cover pages). As an interim step, the three components B1, B2 and B3 of the vulnerability index (see Map B on the cover pages) are described. Finally, the WorldRiskIndex, i.e. the global index, is calculated on the basis of all four components (see Map C on the cover pages).

The 15 most exposed countries

	Country	Exposure (%)
1.	Vanuatu	56.33
2.	Tonga	56.04
3.	Philippines	45.09
4.	Costa Rica	42.39
5.	Japan	39.57
6.	Guatemala	38.42
7.	Solomon Islands	36.40
8.	Brunei Darussalam	36.28
9.	El Salvador	32.18
10.	Chile	31.25
11.	Mauritius	29.59
12.	Netherlands	29.24
13.	Jamaica	28.11
14.	Nicaragua	27.64
15.	Bangladesh	27.52

The 15 most susceptible countries

	Country	Susceptibility (%)
1.	Niger	69.38
2.	Mozambique	68.19
3.	Liberia	67.59
4.	Madagascar	67.51
5.	Eritrea	67.17
6.	Tanzania	65.43
7.	Sierra Leone	64.79
8.	Chad	64.28
9.	Haiti	64.03
10.	Burundi	63.88
11.	Central African Rep.	63.34
12.	Ethiopia	63.11
13.	Zambia	61.63
14.	Afghanistan	61.09
15.	Guinea-Bissau	59.51

Exposure

The world map of exposure (Map A on the rear fold-out page of the cover and the graphic on page 30/31) comparatively shows the potential annual exposure of individual countries to natural hazards such as earthquakes, storms, floods and droughts, as well as the exposure of populations to sea level rise by one meter for each country. Some hotspot regions can clearly be seen, such as Southeast Asia and Central America, which suffer from a very high exposure. However, some individual countries such as Chile, Japan and the Netherlands are extremely exposed when measured by the proportion of population living in exposed areas.

It should be noted that the Solomon Islands and Brunei Darussalam are included in the 15 most exposed countries due to their strong exposure to sea level rise and to droughts. The authors wish to re-emphasize the uncertainties in the calculation of exposure.

Susceptibility

The cartographic representation of susceptibility (see Map B1 on the front fold-out page of the cover) shows relatively high values for the Sahel and the tropical area in Africa. It is also clear that South and Southeast Asia are global hotspots of susceptibility – with the exception of Thailand and Malaysia, which show relatively low susceptibility values (22.44 and 20.12 per cent, respectively). The globally significant north-south divide is less pronounced in the Americas, where they are mostly in the moderate susceptibility range, with the exception Haiti, which is highly susceptible.

The 15 countries with the lowest coping capacities

	Country	Lack of coping capacities (%)
1.	Chad	94.36
2.	Afghanistan	93.94
3.	Guinea	92.13
4.	Central African Rep.	91.20
5.	Sudan	90.90
6.	Burundi	90.68
7.	Guinea-Bissau	89.76
8.	Niger	89.54
9.	Haiti	89.46
10.	Timor-Leste	89.16
11.	Iraq	89.09
12.	Sierra Leone	89.09
13.	Zimbabwe	89.03
14.	Eritrea	87.68
15.	Kenya	87.60

The 15 countries with the lowest adaptive capacities

	Country	Lack of adaptive capacities (%)
1.	Afghanistan	73.55
2.	Comoros	68.75
3.	Niger	68.65
4.	Mali	67.85
5.	Chad	66.78
6.	Sierra Leone	66.62
7.	Djibouti	66.22
8.	Yemen	65.70
9.	Mauritania	64.99
10.	Pakistan	64.58
11.	Papua New Guinea	64.36
12.	Eritrea	63.79
13.	Solomon Islands	63.74
14.	Guinea-Bissau	63.26
15.	Liberia	63.02

Lack of coping capacities

Just as for susceptibility, the lack of coping capacities map (Map B2 on the front fold-out page of the cover) shows a clear north-south divide. It is striking that Italy, Bosnia and Herzegovina as well as Albania, have a worse value than the other Western and Northern European countries. Whereas in Bosnia and Herzegovina and Albania, the still significant influence of the recent war and ongoing conflicts between different population groups are relevant for the values of the Failed States Index (indicator B) and the Corruption Perceptions Index (indicator A), Italy's poor performance in the latter index (3.9 of maximum10 points) is the main reason for its relatively low coping capacities. In addition, Botswana and South Africa perform well (being the sole African countries with better values), which, among other reasons, is due to their more stable political situation and well-developed health care system.

Lack of adaptive capacities

The lack of adaptive capacities map (Map B3 on the front fold-out page of the cover) does not show a clear north-south divide as in the previous maps. Here, South America achieves far better results, especially in the sub-categories of education and research as well as equal participation, in which there is a comparatively high potential for adaptation. Afghanistan ranks the lowest, followed by the Comoros and five African countries.

The 15 most vulnerable countries

	Country	Vulnerability (%)
1.	Afghanistan	76.19
2.	Niger	75.86
3.	Chad	75.14
4.	Sierra Leone	73.50
5.	Eritrea	72.88
6.	Central African Rep.	72.42
7.	Liberia	72.33
8.	Mozambique	71.95
9.	Burundi	71.82
10.	Haiti	71.77
11.	Guinea	71.13
12.	Ethiopia	71.05
13.	Guinea-Bissau	70.84
14.	Madagascar	69.91
15.	Togo	69.45

The 15 countries with the highest risk

	Country	WorldRiskIndex (%)
1.	Vanuatu	32.00
2.	Tonga	29.08
3.	Philippines	24.32
4.	Solomon Islands	23.51
5.	Guatemala	20.88
6.	Bangladesh	17.45
7.	Timor-Leste	17.45
8.	Costa Rica	16.74
9.	Cambodia	16.58
10.	El Salvador	16.49
11.	Nicaragua	15.74
12.	Papua New Guinea	15.45
13.	Madagascar	14.46
14.	Brunei Darussalam	14.08
15.	Afghanistan	14.06

Vulnerability

The vulnerability map (Map B on the rear fold-out page of the cover and the graphic on pages 34/35) shows the result of the combination of susceptibility, lack of coping capacities and lack of adaptive capacities. The map shows that Africa and South and Southeast Asia can be considered hotspots of vulnerability in a global comparison. South America is slightly better off, with the exception of Bolivia and Paraguay. It is also clear that Malaysia, Thailand and Vietnam are less vulnerable in a regional comparison. This can also be seen from the individual observations of the respective indices of susceptibility, lack of coping capacities and lack of adaptive capacities. Afghanistan and many African countries have relatively critical social conditions and processes, which lead to high vulnerability values (see Table).

WorldRiskIndex

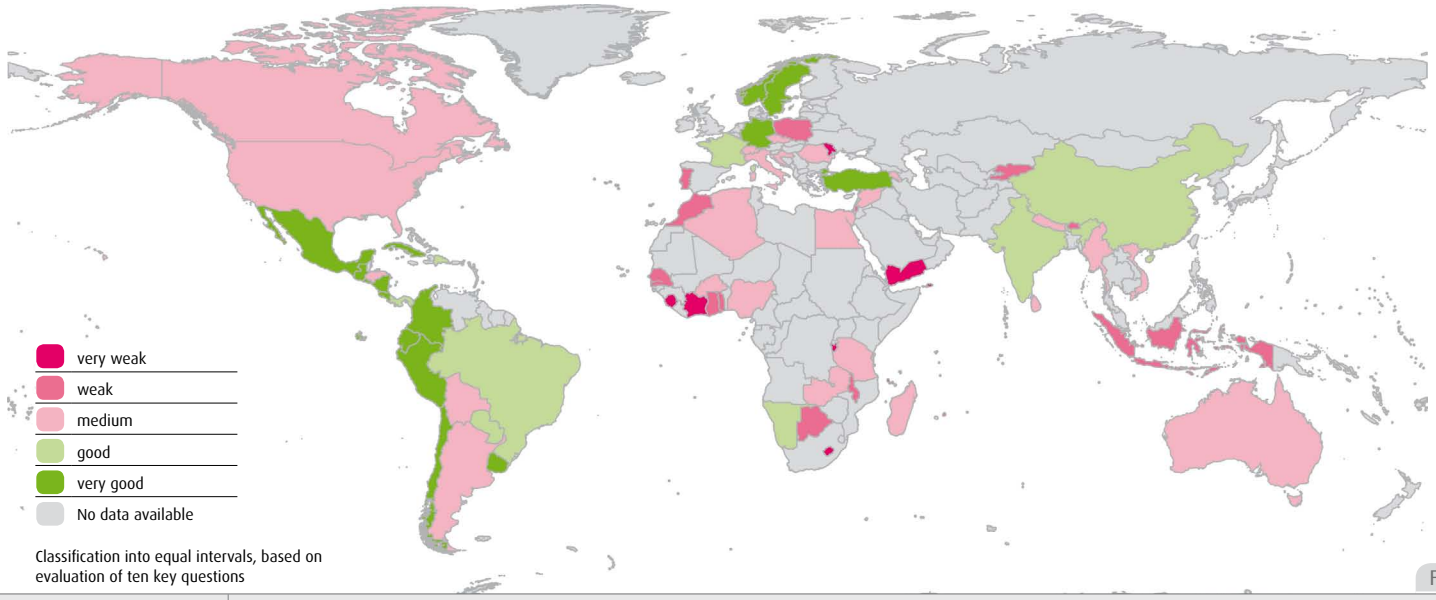
The map for the WorldRiskIndex (Map C on the rear fold-out page of the cover and the graphic on pages 32/33) shows the results of the calculations using the formula shown in Figure 8. Here the strong influence of exposure on the risk of individual countries is obvious, since it is the basic requirement of the underlying calculation hypothesis (multiplicative conjunction). For example, Chile and Japan have very high exposure to natural hazards and hence a relatively high risk, although the vulnerability of both countries when compared globally is very low. This mainly results from the model calculations of the input data ("Physical Exposure"), which are the basis for the component exposure.

Here, probabilities of occurrence as well as the frequency and intensity of natural hazards are taken into account so that single events can, only to a limited extent, be explained by the risk index. For example, only closer inspection of the components reveals that Chile, despite the relatively low level of damage caused by the strong earthquake of 2010, must be represented with a very high risk level, because a large proportion of the population is exposed very regularly to natural hazards, particularly earthquakes and droughts.

In addition, the world maps illustrate a society's or a country's vulnerability impact as a key factor in the risk to natural hazards and climate change, as is shown, for example, when comparing Haiti and New Zealand.

Implementation of the Hyogo Framework for Action

World map showing the implementation of the Hyogo Framework for Action 2009–2011



Classification into equal intervals, based on evaluation of ten key questions

Fig. 9

Excursus 5: Disaster Preparedness

The world map for the disaster preparedness shows the various progress levels that countries have reached for the implementation of the Hyogo Framework for Action in the 2009–2011 period. All country reports were systematically evaluated by Bündnis Entwicklung Hilft based on ten key questions instead of using the self-assessment of the countries. This closer examination enabled a more nuanced assessment and it can be seen, for example, that the United States and Australia have significantly lower levels than Germany or Turkey. When this evaluation is compared with the self-assessment of countries (UNISDR 2011), it can be noted that many countries perform less well in this latter, more nuanced approach, but that, in particular, the countries of Central and South America have comparatively better values. The analysis and the ten key questions are available at www.WorldRiskReport.org.

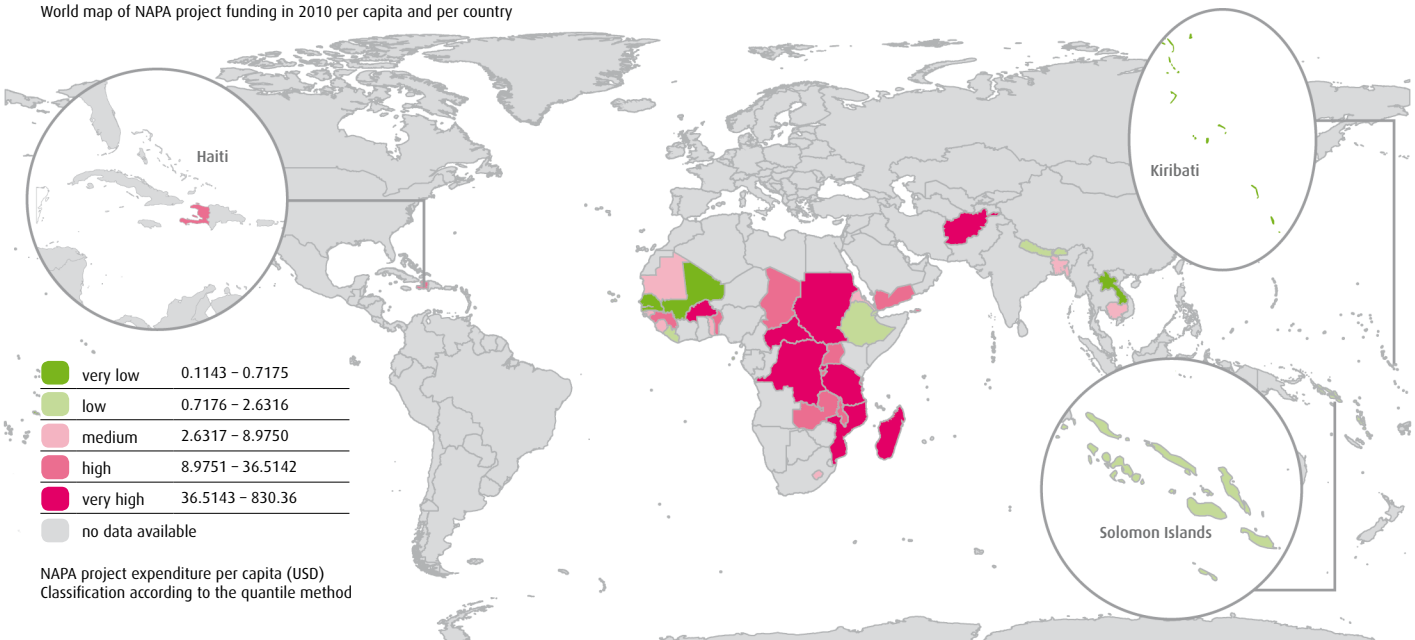
Excursus 6: National Adaptation Strategies

Here, the study considers whether governments have developed the necessary adaptation strategies and which financial resources are earmaked and made available by the international community; to date, the data are insufficient for a full analysis. For this component, it is possible, for example, to recur to the National Action Programmes for Adaptation (NAPAs) under the United Nations Framework Convention on Climate Change (UNFCCC), which are drawn up and implemented by Least Developed Countries (LDCs) and funded by the industrialized nations. The world map shows the per capita investments for the implementation of all selected priority projects, which are recorded in a list of all projects in the NAPA priority data bank of the UNFCCC (2010). It becomes clear that the data for the NAPA aid volumes in many cases are available for countries that, according to the WorldRiskIndex, have very low adaptive capacities and are very exposed, such as Small Island States. Here, however, only the most urgent adaptation projects are identified, and in some cases, a purely sectoral perspective is given. Moreover, LDCs and other developing countries develop comprehensive adaptation strategies that could be used in future to calculate the WorldRiskIndex.

Fig. 10

Project funding for adaptation measures

World map of NAPA project funding in 2010 per capita and per country



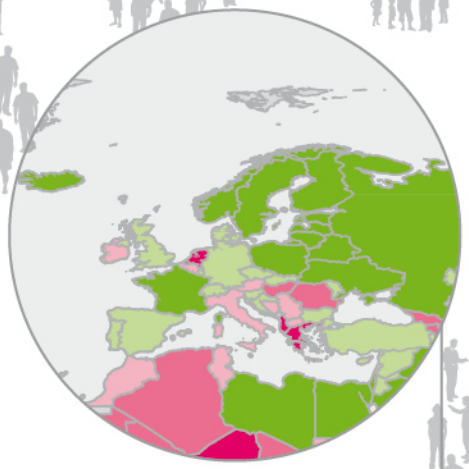
NAPA project expenditure per capita (USD)
Classification according to the quantile method

Bündnis Entwicklung Hilft

Exposure index

North and Central America

42.39 %	Costa Rica
38.42 %	Guatemala
32.18 %	El Salvador
28.11 %	Jamaica
27.64 %	Nicaragua
24.91 %	Dominican Republic
21.81 %	Honduras
17.27 %	Panama
15.97 %	Trinidad and Tobago
15.95 %	Haiti
15.17 %	Cuba
14.75 %	Mexico
12.59 %	Belize
12.00 %	United States of America
11.71 %	Equatorial Guinea
11.08 %	Bahamas
9.08 %	Canada
6.87 %	Barbados
4.90 %	Grenada



Europe

29.24 %	Netherlands
22.47 %	Albania
20.89 %	Greece
15.68 %	Romania
15.37 %	Hungary
14.28 %	Macedonia
14.14 %	Italy
14.09 %	Ireland
13.89 %	Bosnia and Herzegovina
13.40 %	Austria
13.10 %	Serbia
11.82 %	Belgium
11.75 %	Slovenia
11.61 %	United Kingdom
11.17 %	Croatia
11.14 %	Germany
11.08 %	Bulgaria
11.02 %	Portugal
11.00 %	Czech Republic
10.65 %	Spain
10.53 %	Denmark
10.24 %	Moldova
10.18 %	Slovak Republic
10.09 %	Luxembourg
9.96 %	Switzerland
9.64 %	France
9.60 %	Poland
8.75 %	Norway
8.66 %	Latvia
8.39 %	Lithuania
8.14 %	Finland
8.14 %	Sweden
8.03 %	Belarus
7.20 %	Ukraine
6.80 %	Estonia
6.22 %	Iceland
2.15 %	Malta

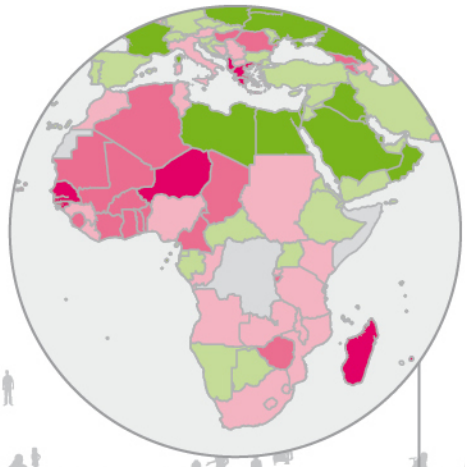
South America

31.25 %	Chile
19.52 %	Suriname
18.13 %	Ecuador
17.85 %	Guyana
15.08 %	Peru
14.00 %	Colombia
13.42 %	Venezuela
10.84 %	Uruguay
9.71 %	Argentina
9.70 %	Brazil
9.34 %	Bolivia
7.68 %	Paraguay

very low	0.05 – 9.71
low	9.72 – 11.82
medium	11.83 – 14.28
high	14.29 – 17.85
very high	17.86 – 56.33
no data available	

Maximum exposure = 100 %
Classification according to the quantile method

Data: Source UNU-EHS, based on the PREVIEW Global Risk Data Platform, CReSIS, CIESIN and global databases; detailed information at www.WorldRiskReport.org



Asia

45.09 % Philippines
39.57 % Japan
36.28 % Brunei Darussalam
27.52 % Bangladesh
26.66 % Cambodia
25.97 % Timor-Leste
24.63 % Bhutan
22.02 % Vietnam
20.49 % Indonesia
18.45 % Afghanistan
17.28 % Uzbekistan
17.09 % Kyrgyzstan
15.59 % Malaysia
15.11 % Georgia
15.05 % Sri Lanka
14.84 % Thailand
14.67 % Armenia
14.47 % Myanmar (Burma)
13.90 % Azerbaijan
13.77 % Turkmenistan
13.56 % Tajikistan
12.89 % China
12.68 % India
12.34 % Republic of Korea
12.27 % Pakistan
11.81 % Turkey
11.50 % Jordan
11.35 % Syria
11.12 % Lebanon
10.62 % Cyprus
10.48 % United Arab Emirates
10.40 % Iran
10.23 % Yemen
9.97 % Nepal
9.71 % Kazakhstan
9.70 % Lao PDR
9.21 % Singapore
9.18 % Iraq
9.07 % Russian Federation
8.96 % Kuwait
7.13 % Israel
6.99 % Mongolia
6.41 % Oman
4.03 % Bahrain
2.91 % Saudi Arabia
0.05 % Qatar

Africa

29.59 % Mauritius
22.20 % Gambia
20.68 % Madagascar
18.70 % Senegal
18.53 % Guinea-Bissau
18.49 % Niger
17.25 % Cape Verde
16.92 % Burkina Faso
16.59 % Mali
16.51 % Algeria
16.30 % Chad
16.23 % Cameroon
16.20 % Benin
16.09 % Burundi
15.67 % Ghana
15.31 % Sierra Leone
14.98 % Togo
14.57 % Mauritania
14.50 % Côte d'Ivoire
14.30 % Zimbabwe
13.86 % Mozambique
13.73 % Malawi
13.72 % Rwanda
13.71 % Sudan
13.41 % Nigeria
13.41 % Morocco
13.35 % Guinea
12.91 % Tanzania
12.89 % Zambia
12.88 % Angola
12.71 % Liberia
12.46 % Lesotho
12.43 % Tunisia
12.42 % South Africa
12.19 % Congo, Republic of
11.98 % Swaziland
11.90 % Kenya
11.82 % Gabon
11.76 % Namibia
11.68 % Uganda
11.64 % Ethiopia
11.52 % Botswana
11.14 % Djibouti
10.10 % Comoros
9.91 % Central African Republic
9.90 % Eritrea
7.53 % Libya
6.28 % São Tomé and Príncipe
6.09 % Seychelles
4.79 % Egypt

Oceania

56.33 % Vanuatu
56.04 % Tonga
36.40 % Solomon Islands
25.87 % Fiji
23.26 % Papua New Guinea
15.73 % New Zealand
14.95 % Samoa
14.72 % Australia
3.31 % Kiribati

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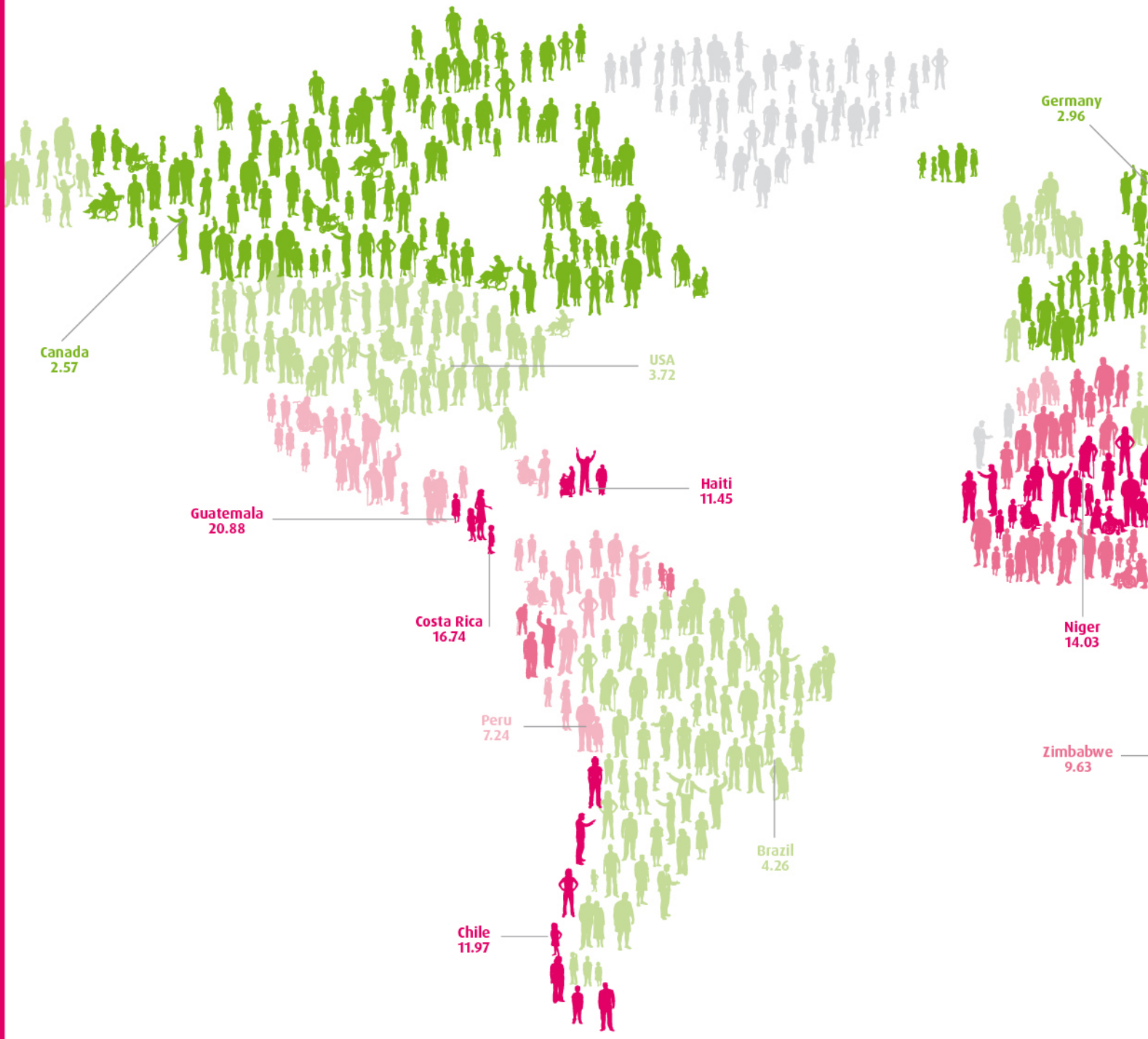
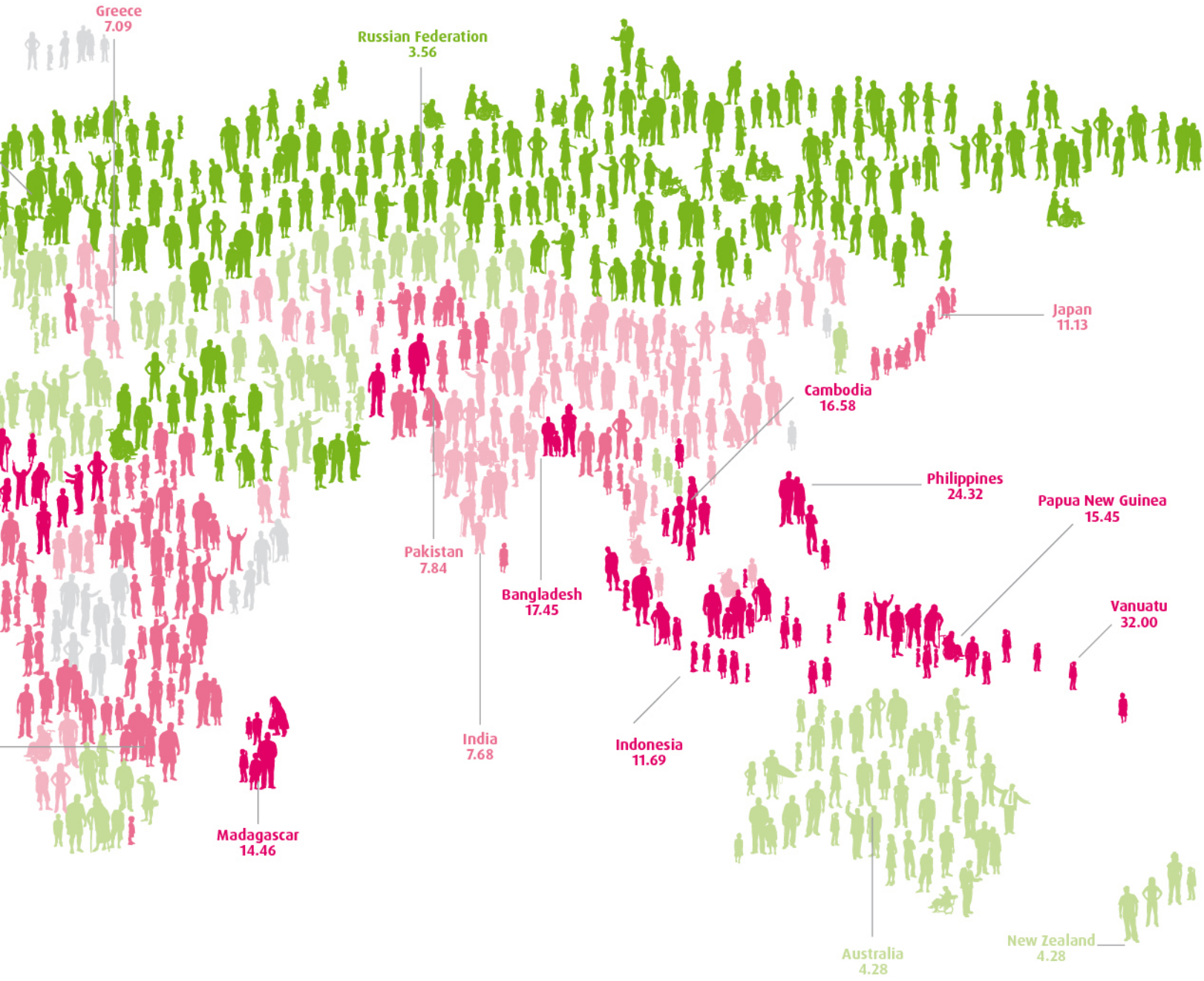
WorldRiskIndex



WorldRiskIndex (WRI)		Exposure		Vulnerability	
very low	0.00 – 3.56		0.05 – 9.71		24.57 – 35.63
low	3.57 – 5.80		9.72 – 11.82		35.64 – 45.03
medium	5.81 – 7.71		11.83 – 14.28		45.04 – 53.50
high	7.72 – 11.13		14.29 – 17.85		53.51 – 63.32
very high	11.14 – 32.00		17.86 – 56.33		63.33 – 76.19
no data available		no data available		no data available	

Maximum value 100 %, classification according to the quantile method.

Data: Source UNU-EHS, based on the PREVIEW Global Risk Data Platform, CReSIS, CIESIN and global databases; detailed information at www.WorldRiskReport.org



Country	Exposure	Vulnerability	WRI
Australia	14.72 %	29.09 %	4.28 %
Bangladesh	27.52 %	63.41 %	17.45 %
Brazil	9.70 %	43.87 %	4.26 %
Chile	31.25 %	38.31 %	11.97 %
Costa Rica	42.39 %	39.50 %	16.74 %
Germany	11.14 %	26.55 %	2.96 %
Greece	20.89 %	33.94 %	7.09 %
Guatemala	38.42 %	54.35 %	20.88 %
Haiti	15.95 %	71.77 %	11.45 %

Country	Exposure	Vulnerability	WRI
India	12.68 %	60.55 %	7.68 %
Indonesia	20.49 %	57.06 %	11.69 %
Japan	39.57 %	28.13 %	11.13 %
Cambodia	26.66 %	62.18 %	16.58 %
Canada	9.08 %	28.32 %	2.57 %
Madagascar	20.68 %	69.91 %	14.46 %
New Zealand	15.73 %	27.19 %	4.28 %
Niger	18.49 %	75.86 %	14.03 %
Pakistan	12.27 %	63.84 %	7.84 %

Country	Exposure	Vulnerability	WRI
Papua N. G.	23.26 %	66.41 %	15.45 %
Peru	15.08 %	47.99 %	7.24 %
Philippines	45.09 %	53.93 %	24.32 %
Russian Fed.	9.07 %	39.27 %	3.56 %
Zimbabwe	14.30 %	67.33 %	9.63 %
Vanuatu	56.33 %	56.81 %	32.00 %
United States	12.00 %	30.98 %	3.72 %

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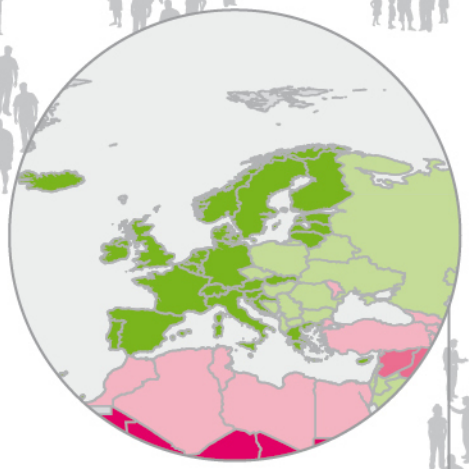
Vulnerability index

North and Central America

71.77 %	Haiti
57.36 %	Equatorial Guinea
56.94 %	Nicaragua
55.50 %	Honduras
54.35 %	Guatemala
51.24 %	El Salvador
48.17 %	Dominican Republic
47.14 %	Belize
46.71 %	Grenada
45.85 %	Jamaica
44.56 %	Panama
44.27 %	Mexico
41.98 %	Trinidad and Tobago
40.81 %	Bahamas
39.50 %	Costa Rica
39.49 %	Cuba
35.54 %	Barbados
30.98 %	United States of America
28.32 %	Canada



Europe

46.74 %	Moldova
45.00 %	Bosnia and Herzegovina
44.42 %	Albania
41.91 %	Ukraine
41.55 %	Serbia
41.03 %	Macedonia
41.02 %	Romania
37.75 %	Czech Republic
37.15 %	Belarus
36.78 %	Bulgaria
35.73 %	Hungary
35.62 %	Latvia
35.63 %	Poland
34.43 %	Lithuania
33.94 %	Greece
33.54 %	Italy
33.34 %	Malta
33.22 %	Slovak Republic
33.22 %	Croatia
33.15 %	Estonia
32.85 %	Portugal
31.65 %	Slovenia
31.11 %	United Kingdom
30.87 %	Spain
29.66 %	Belgium
29.46 %	Ireland
28.60 %	France
27.16 %	Denmark
26.78 %	Luxembourg
26.55 %	Germany
26.37 %	Netherlands
26.09 %	Norway
25.57 %	Switzerland
25.48 %	Austria
25.27 %	Finland
25.01 %	Iceland
24.57 %	Sweden

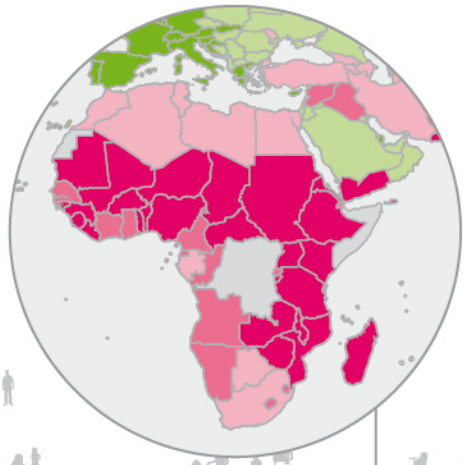
South America

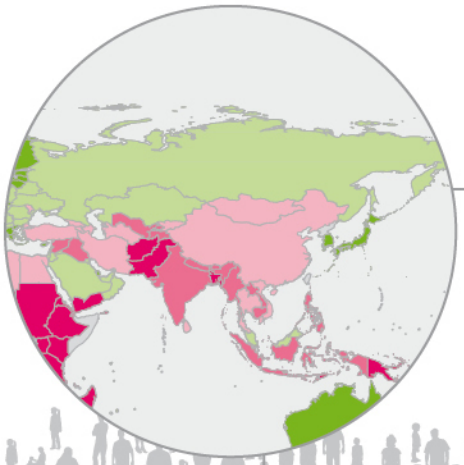
55.23 %	Bolivia
53.63 %	Paraguay
50.55 %	Guyana
49.03 %	Colombia
47.99 %	Peru
47.97 %	Ecuador
47.40 %	Suriname
45.57 %	Venezuela
43.87 %	Brazil
38.80 %	Argentina
38.31 %	Chile
36.35 %	Uruguay

very low	24.57 – 35.63
low	35.64 – 45.03
medium	45.04 – 53.50
high	53.51 – 63.32
very high	63.33 – 76.19
no data available	

Max. vulnerability = 100%,
Classification according to the quantile method

Data: Source UNU-EHS, based on the PREVIEW Global Risk Data Platform, CReSIS, CIESIN and global databases; detailed information at www.WorldRiskReport.org





Asia

76.19% Afghanistan
67.17% Timor-Leste
66.76% Yemen
63.84% Pakistan
63.41% Bangladesh
62.87% Iraq
62.18% Cambodia
61.69% Nepal
60.55% India
59.78% Lao PDR
59.02% Myanmar (Burma)
57.06% Indonesia
55.42% Bhutan
55.11% Tajikistan
54.50% Syria
54.25% Uzbekistan
53.93% Philippines
52.14% Sri Lanka
50.89% Vietnam
50.44% Turkmenistan
49.63% Kyrgyzstan
49.30% China
49.13% Mongolia
49.07% Iran
48.94% Azerbaijan
47.01% Armenia
46.25% Thailand
46.15% Georgia
45.57% Turkey
45.03% Lebanon
44.61% Jordan
43.60% Oman
43.30% Saudi Arabia
42.88% Malaysia
41.55% Kazakhstan
41.35% Kuwait
41.27% Bahrain
39.27% Russian Federation
38.99% United Arab Emirates
38.83% Brunei Darussalam
36.44% Israel
33.55% Republic of Korea
33.18% Qatar
32.63% Cyprus
30.97% Singapore
28.13 % Japan

Africa

75.86 % Niger
75.14 % Chad
73.50 % Sierra Leone
72.88 % Eritrea
72.42 % Central African Republic
72.33 % Liberia
71.95 % Mozambique
71.82 % Burundi
71.13 % Guinea
71.05 % Ethiopia
70.84 % Guinea-Bissau
69.91 % Madagascar
69.45 % Togo
69.35 % Mali
68.60 % Comoros
68.46 % Burkina Faso
67.44 % Sudan
67.37 % Nigeria
67.33 % Zimbabwe
67.24 % Benin
66.97 % Tanzania
66.59 % Mauritania
65.75 % Kenya
65.48 % Malawi
65.27 % Zambia
64.87 % Uganda
63.32 % Rwanda
63.29 % Cameroon
63.29 % Djibouti
63.28 % Congo, Republic of
63.12 % Lesotho
62.90 % Senegal
62.63 % Gambia
62.27 % Côte d'Ivoire
62.28 % Angola
61.56 % Swaziland
59.66 % Ghana
59.45 % São Tomé and Príncipe
56.41 % Namibia
54.86 % Cape Verde
53.49 % Morocco
53.34 % Gabon
49.62 % Egypt
48.80 % Algeria
48.74 % Libya
48.26 % Botswana
46.04 % Tunisia
46.02 % South Africa
43.97 % Seychelles
40.24 % Mauritius

Oceania

66.41 % Papua New Guinea
64.60 % Solomon Islands
56.87 % Kiribati
56.81 % Vanuatu
52.69 % Samoa
52.48 % Fiji
51.90 % Tonga
29.09 % Australia
27.19 % New Zealand

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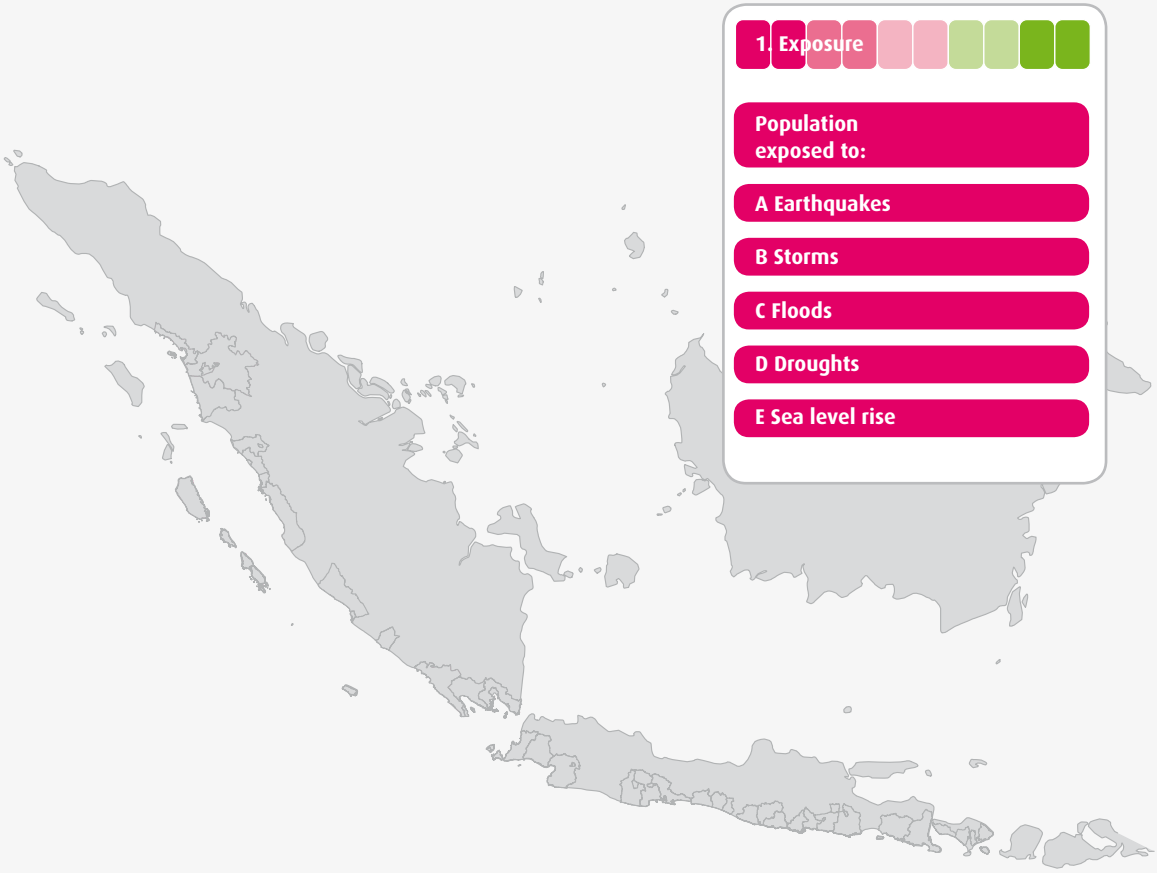


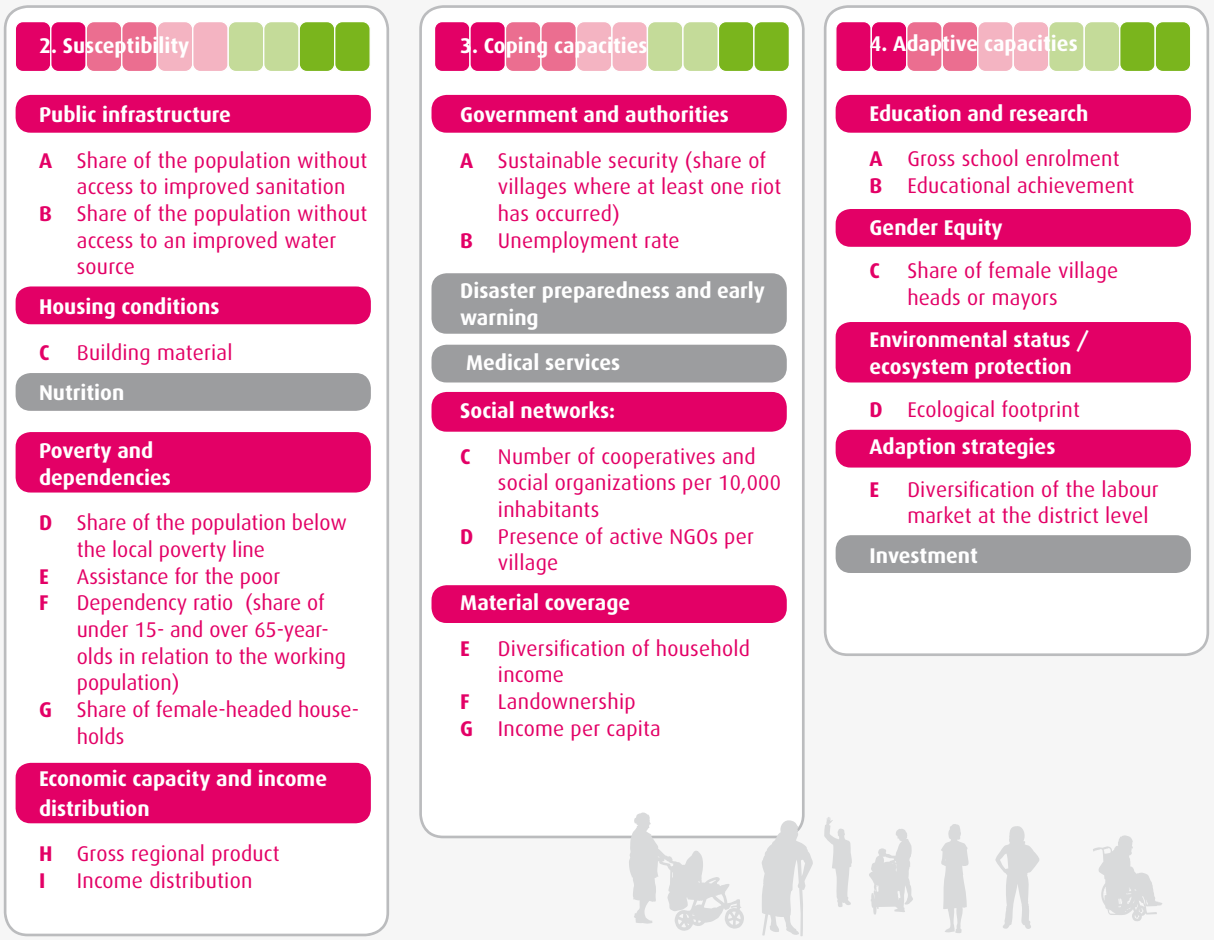
Figure 11: Indicators of the local risk index (Indonesia)

2.6 Local risk assessment

Following the methodology of the global index, an index was developed for the local level and tested for Indonesia in order to separately illustrate and examine the local and regional differences in terms of exposure, susceptibility, coping capacities and adaptive capacities. To this end, the WorldRiskIndex could be supplemented by a few indicators for vulnerability, which were not available at the global level.

The higher resolution of the local risk index made it possible to represent the exposure and vulnerability on a smaller scale. Thus high-risk areas could be represented on a scale relevant for practitioners. In-depth analysis of the local risk index depends in most cases on the availability and resolution of socio-economic data. For Indonesia, the case study was conducted at the level of the kabupaten (a political subdivision of Indonesia, roughly comparable with a district in Germany), for which the various statistics are available that are collected by the National Offices of Statistics.

To calculate the exposure, the same data set was used as for the global index and related to the administrative boundaries of the kabupatens to determine the respective proportion of the exposed population. Figure 11 lists the indicators which were used for the calculation of the local risk index.



Although the structure of the local risk index corresponds to the structure of the global index and could be supplemented by additional indicators, some indicators had to be adapted to the data or discarded. One of the advantages of a local risk index, which is clearly shown in Figure 9, is the possibility of taking into account some important aspects that would also be relevant at the national level, for which no globally comparable data are available. Thus, it was possible to include the following indicators in the local index: the building material used the number of cooperatives, social associations and active NGOs, and local conflicts. The diversification of the labor market and employment structure could also be used as an indicator for the adaptive capacities that could describe the potential of switching to alternative economic sectors at the district level.

Below is a description of the results of the local risk index for three Indonesian districts (kabupatens), namely Padang, the capital of the province of West Sumatra; the predominantly agricultural district of Cilacap in the Province of Central Java; and Gianyar on the island of Bali. The Table below provides the results of the individual components for the three districts.

Exposure

It can clearly be seen in the Table as well as from the exposure map (Figure 15) that both

Padang and Cilacap have a high proportion of exposed population (37 per cent and 39.6 per cent, respectively),while Gianyar is exposed at a lower, but still significant level (26.6 per cent).

Susceptibility

The susceptibility map (Figure 12) reveals that Gianyar and Padang show significantly better results than Cilacap. This is due, on the one hand, to the influence of tourism, which in Gianyar has led to the creation of, *inter alia*, a comparatively good infrastructures, a good construction quality and a relatively low level of poverty; on the other hand, a marked urban-rural divide between Padang and Cilacap is obvious, since Cilacap has a worse performance than Padang in terms of water supply and sanitation as well as on dependencies. This can be explained by the higher regional importance of a provincial capital, which attracts young people searching for training or work, thus adding to the working-age population.

Lack of coping capacities

The lack of coping capacities map (Figure 13) shows that Gianyar has a better capacity to cope with events than both Padang and Cilacap since it enjoys the highest income level and the lowest unemployment rate among the three areas. In addition, a higher share of the population in Gianyar owns real estate. Padang and Cilacap do not differ greatly from each other but, due to class boundaries, they are represented in different colors in the cartographic representation. In Padang, the income is considerably higher than in Cilacap, however, the share of the population owning real estate is much lower because of the high proportion of students and migrant workers in its population. In addition, the diversification of household income is less favorable. Although the values for unemployment and social networks are better in Padang than in Cilacap, the district as a whole ranks less favorably.

Lack of adaptive capacities

The evaluation of the adaptive capacities (Figure 14) shows that Padang and Gianyar are much better off than Cilacap. Padang achieves better results than Gianyar and Cilacap for all indicators with the exception of the diversification of the labor market. Padang performs especially well in the areas of education and research and equal participation. Gianyar also achieves good values in most cases, ranking only about nine percentage points behind Padang (57.9 per cent compared with 48.8 per cent), while Cilacap again reaches a significantly worse value (64.7 per cent), because the diversification of its labor market is the only area, in which this district achieves results that are comparable with those of the district of Padang.

Vulnerability index

The combination of the three components – susceptibility, coping capacities and adaptive capacities – shows the relative vulnerability (Figure 16) of the surveyed districts. While Gianyar has the lowest vulnerability at 33.6 per cent, and Padang also has a fairly low value at 39.5 per cent, Cilacap is definitely behind at 48.6 per cent. Here, it becomes clear that despite its poor performance in the area of coping capacities, Padang manages to reach a lower vulnerability level as a result of its better susceptibility and adaptive capacities values.

Comparison of the local risk index components for the Districts of Padang, Cilacap and Gianyar

Components (%)		Padang (Sumatra)	Cilacap (Java)	Gianyar (Bali)
Exposure	(min: 2.4 / max: 59.9)	39.7	37.0	26.6
Susceptibility	(min: 11.1 / max: 47.9)	16.7	31.0	11.3
Lack of coping capacities	(min: 31.8 / max: 68.2)	52.9	50.1	31.8
Lack of adaptive capacities	(min: 48.8 / max: 70.7)	48.8	64.7	57.9
Vulnerability	(min: 33.6 / max: 62.3)	39.5	48.6	33.6
Risk	(min: 1.3 / max: 37.3)	15.6	18.0	9.0

Risk index

The aggregated index for the local level (Figure 17) shows the highest risk towards earthquakes, storms, floods, droughts and sea level rise for the Mentawai island group, where a highly vulnerable population is heavily exposed. Padang compares favorably to similarly exposed Cilacap, achieving better results in the components of vulnerability, but remains risky due to the high exposure.

Using the example of Gianyar, it is shown that low vulnerability can mitigate the exposure, resulting in a lower risk.

2.7 Results and challenges

The WorldRiskIndex shows significant differences between exposure to natural hazards and climate change, and vulnerability. Visualizing and communicating such differences using selected quantitative indicators at the global and local levels are important tools to illustrate that not only do natural hazards and environmental change lead to the emergence of a disaster, but also to a very high degree social vulnerability.

At a glance, it is possible to identify countries that have a high risk to natural hazards and climate change. When dealing with particular events, it is even more important, however, to be attentive to the considerable regional structural differences between susceptibility, coping capacities and adaptive capacities that exist regardless of the degree of exposure. Although the global index can visualize only some aspects of the complex reality, the maps and the selected indicators provide important information on which factors require special attention at the global level. In addition, the identification of regional hotspots with respect to future threats such as sea level rise may be an important basis for discussion of strengthening disaster risk reduction in humanitarian aid and development policy, but must be complemented by local, regional and national reports and lessons learned.

For the systematic and continuous development of the WorldRiskIndex, one should keep in mind the following challenges:

+ Constant updating of the indicators database in order to allow the index to be relevant as a monitoring tool;
+ developing methods to better evaluate the response capacities of society, since they represent an important variable in risk reduction and facilitate a multi-hazard approach;
+ further improving methods and data at a global level in order to be able to better evaluate uncertainties, such as improved climate models to provide accurate calculations for the sea level rise and droughts;
+ conducting more research into the dynamic processes of vulnerability in order to better detect possible changes of the various aspects of susceptibility, the coping capacities and the adaptive capacities.

Susceptibility – case study Indonesia

dependent on infrastructure, nutrition, income and the general economic framework

very low	11.09 – 20.76
low	20.77 – 29.61
medium	29.62 – 34.98
high	34.99 – 36.93
very high	36.94 – 47.86
no data available	

Max. susceptibility = 100%,
Classification according to the quantile method

Fig. 12

Lack of coping capacities – case study Indonesia

dependent on government policies, medical care and material coverage

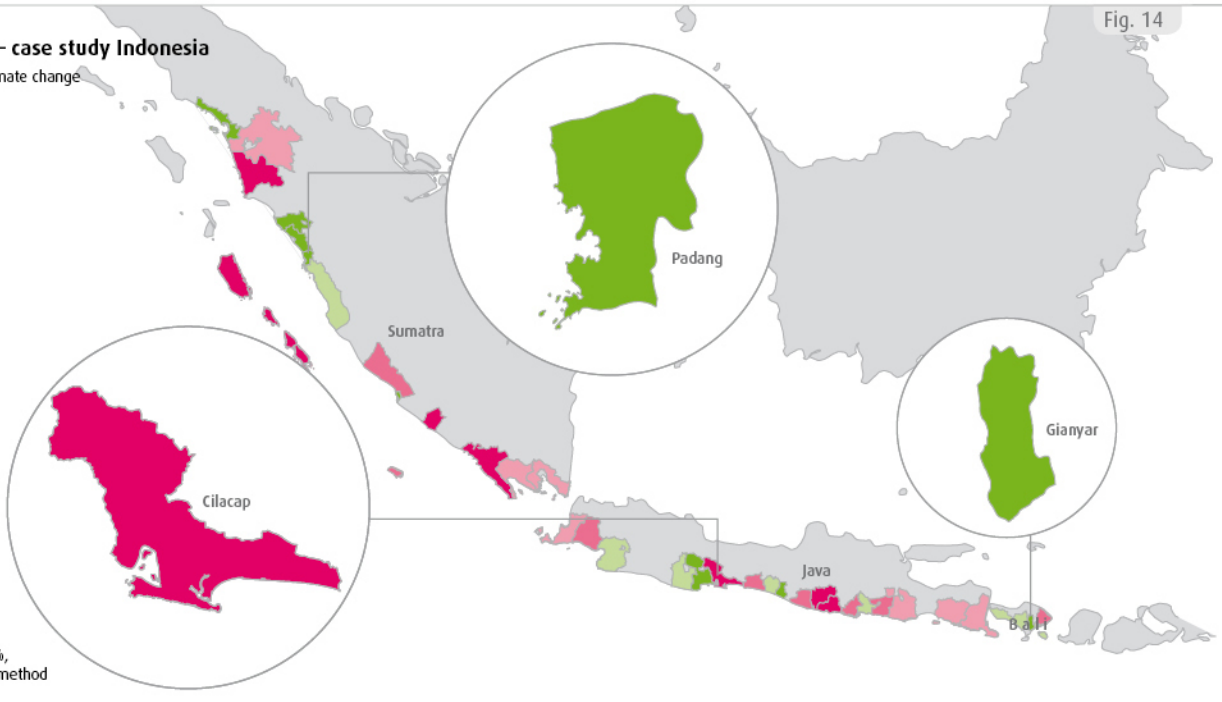
very low	31.77 – 42.69
low	42.70 – 46.43
medium	46.44 – 48.66
high	48.67 – 50.73
very high	50.74 – 68.22
no data available	

Max. lack of coping capacities = 100%,
Classification according to the quantile method

Fig. 13

Lack of adaptive capacities – case study Indonesia

related to future natural events and climate change



very low	48.84 – 61.37
low	61.38 – 62.56
medium	62.57 – 63.59
high	63.60 – 64.44
very high	64.45 – 70.72
no data available	

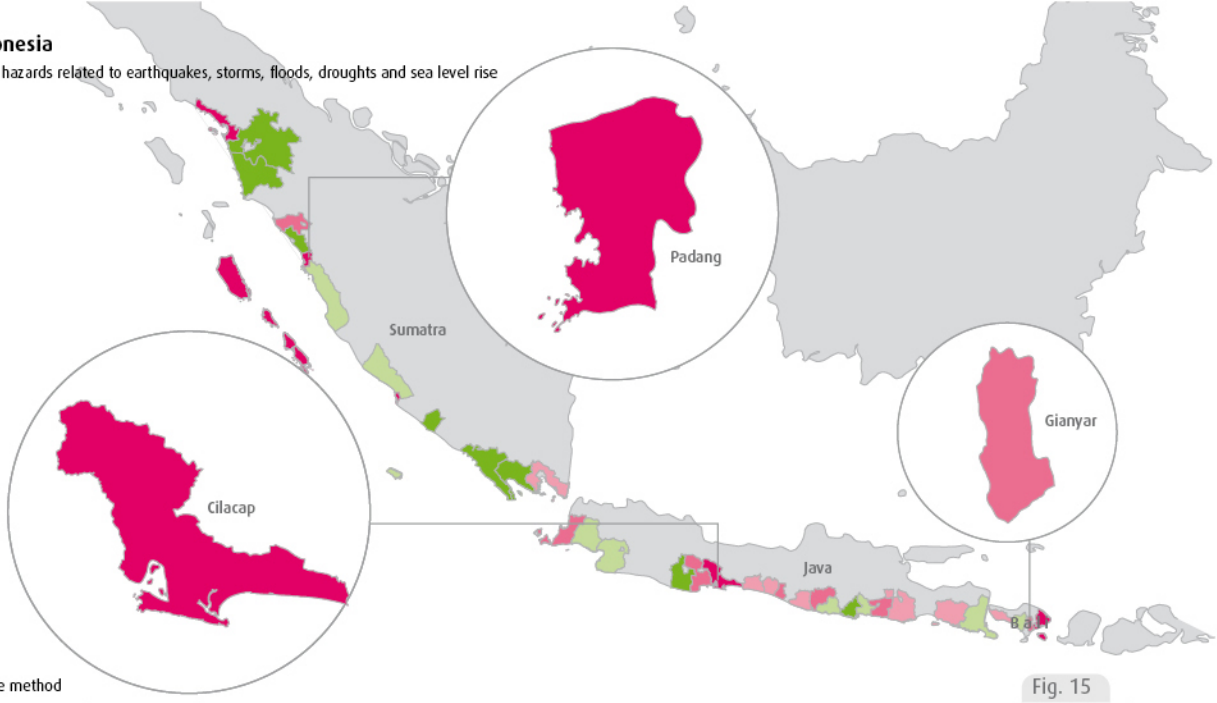
Max. lack of adaptive capacities = 100%,
Classification according to the quantile method

Fig. 14

Data: Source UNU-EHS, based on the PREVIEW Global Risk Data Platform, CReSIS, CIESIN and global databases; detailed information at www.WorldRiskReport.org

Exposure – case study Indonesia

Exposure of the population to natural hazards related to earthquakes, storms, floods, droughts and sea level rise



very low	2.38 – 17.16
low	17.17 – 22.35
medium	22.36 – 25.10
high	25.11 – 33.57
very high	33.58 – 59.87
no data available	

Max. Exposure = 100%,
Classification according to the quantile method

Fig. 15

Vulnerability – case study Indonesia

Vulnerability of society as the sum of susceptibility, lack of coping capacities and lack of adaptive capacities

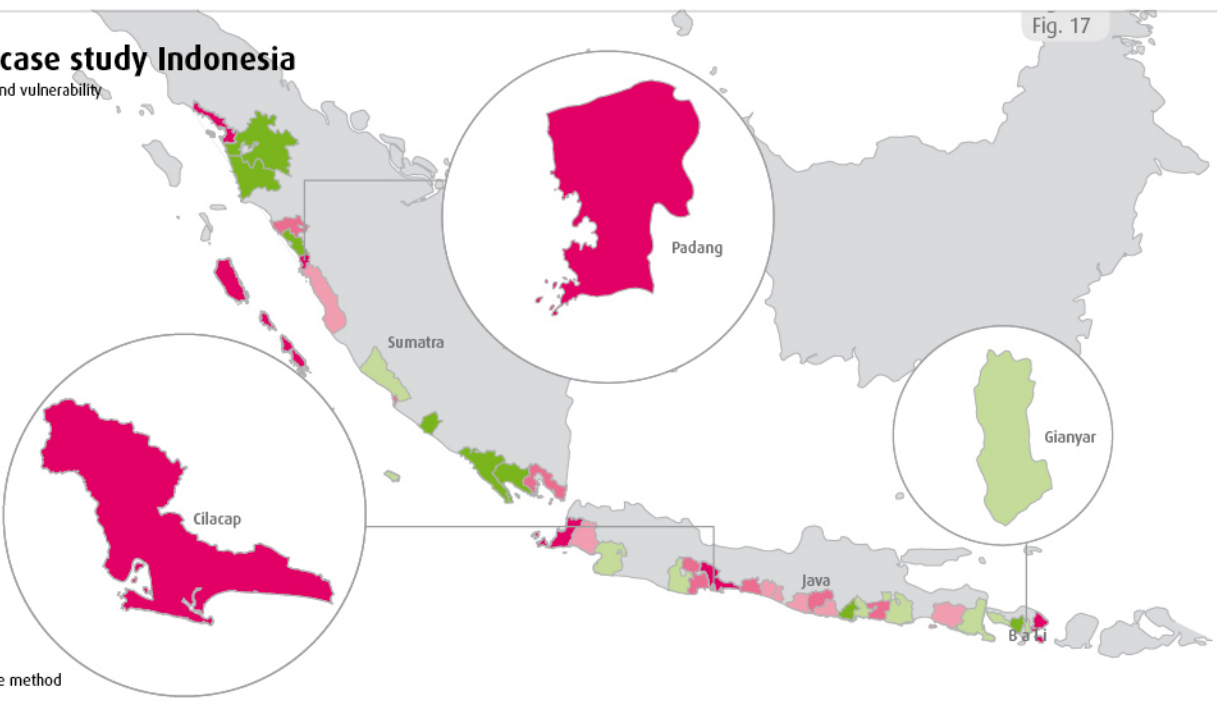
very low	33.65 – 42.46
low	42.47 – 45.88
medium	45.89 – 48.15
high	48.16 – 50.11
very high	50.12 – 62.27
no data available	

Max. vulnerability = 100%,
Classification according to the quantile method

Fig. 16

Local risk index – case study Indonesia

Risk index as the result of exposure and vulnerability



very low	1.27 – 8.17
low	8.18 – 10.29
medium	10.30 – 11.45
high	11.46 – 14.37
very high	14.38 – 37.28
no data available	

Max. risk = 100%,
Classification according to the quantile method

Fig. 17

Data: Source UNU-EHS, based on the PREVIEW Global Risk Data Platform, CRESIS, CIESIN and global databases; detailed information at www.WorldRiskReport.org

3. Focal topic: Governance and civil society

What risks are caused by “fragile” states, regarding natural hazards? What influence on disaster prevention do actors of the civil society have? How can they demand responsible and effective governance? The focal topic of WorldRiskReport 2011 deals with the complex relationship of “Governance and civil society” in the field of disaster prevention and disaster management. In addition to two keynote articles, it features case studies of projects of *Bündnis Entwicklung Hilft* member organizations, which show how civil society initiatives for disaster risk reduction and good governance work hand in hand.

3.1 State failure as a risk factor – How natural events turn into disasters

Whether natural events turn into disasters depends critically on the coping and adaptive capacities of governments. In 2010, when an earthquake with a magnitude of 7.0 on the moment magnitude scale struck Haiti, the consequences were devastating. More than 220,000 people were killed in the disaster (CRED EM-DAT 2011), as many people injured and 1.5 million became homeless. In some villages, about 90 per cent of buildings were destroyed. Although it was the worst earthquake in Haiti in 200 years and the epicenter was only about 25 km from Port au Prince, the capital of the country, it soon became clear that the impact of the earthquake was so severe and destructive not only because of its natural force, but also the almost complete failure of the Haitian State, as could be observed later through a comparison with a much stronger earthquake that occurred in Chile.

Weak governance – big risk

Weak governance is one of the most important risk factors with regard to the impact of natural hazards, which is shown, inter alia, in the number of deaths: states with strong institutions have fewer deaths after extreme natural events than those with weak or inexistent institutions (Kahn 2005).

In states considered weak according to the Failed States index of the Fund for Peace, the government cannot or can only partially provide its citizens with basic government functions, such as security and welfare benefits, or rule of law. Many of these states primarily act as "skimming devices": most available funds are used for their own personnel and do not flow into public interest-oriented development processes. Often, there is an oversized police and military apparatus, which cannot ensure appropriate security due to poor education and low pay of their personnel, especially in the lower echelons, as well as widespread corruption. Most weak states have only a small taxable income base since no taxes can be collected from the usually large segments of poor people, and the citizens with higher income are not properly recorded or are rarely asked to pay because of corruption. The resulting poor condition of infrastructure leads to further weakening of the enforcement capacity of the state. In addition, there is often a lack of qualified personnel or the administration is characterized by clientelistic structures that lead to inefficient administrative procedures and, not infrequently, to individuals taking advantage of the state and its structures for private interests.

The effects of weak governance, particularly on the capacities of societies to cope with and adapt to natural hazards are enormous. The state is rarely able or ready to establish a functioning system of disaster preparedness and to implement it. Due to the lack of monitoring capacities of the government and high levels of corruption, building regulations – if they exist – can be bypassed. The development of disaster preparedness plans is often prevented by the low qualification or sheer non-existence of state personnel. Further, insufficient government revenue hinders the regular conduct of awareness campaigns and the installation of early warning systems and information portals. Also, public health care in poor states is often provided insufficiently. Only rarely is it possible to develop public services so as to be prepared for coping with disasters. Lack of investment in education and research, and the resulting low level of education limit the possibilities of the population to develop strategies to cope with disasters and thus reduce the adaptive capacities of society (see box on Haiti). Yet, examples from states that have succeeded in recent years in significantly strengthening their institutions prove much more successful in coping with and adapting to disasters (see box on Chile).

Haiti – a reason for concern

Haiti is a "fragile state". In the Failed States index of the Fund for Peace, Haiti is ranked 11th, only slightly behind Somalia, Afghanistan, the Democratic Republic of the Congo and Sudan (The Fund for Peace 2011). Although the President, the Prime Minister and many government members are credited for their great interest and involvement, the Government is barely able to act effectively. The political system is fractioned and decision-making processes are extremely difficult (Collier 2009).

Furthermore, political corruption is a widespread phenomenon among the elite. Although the Haitian government has recognized for a long time that it is responsible for the provision of welfare benefits in the sectors of health and education, it does not have a successful track record. Most social services have been and still are delivered by NGOs. In general, the quality of government services is very poor. The inefficiency of the government and its predecessors is also reflected by the lack of building regulations and standards in the country as well as the fact that national disaster management systems have been introduced only very gradually and emergency services have received no assistance (Oxfam 2010). In addition to the severe poverty of the country, Haiti being the poorest country in the Western hemisphere, the serious shortcomings of the Government contributed significantly to the impact of the earthquake of 12 January 2010, which was one of the biggest disasters in the world in recent years.

When neighbors save lives

How hard a natural hazard strikes a society does not exclusively depend on the strength of the state. For instance, there are relatively strong, autocratic states that theoretically have the capacity of functioning disaster preparedness, but not the will to protect their citizens accordingly. Examples include the Democratic People's Republic of Korea and Myanmar. For instance, when Cyclone Nargis swept through the Bay of Bengal in 2008 and devastated five regions of Myanmar, including the former capital of Yangon, it quickly became clear that that the military regime ruling the country was barely able to provide on its own the urgently needed emergency aid for the affected population. In addition, the Junta declared the 15,000 km² of Irrawaddy Delta a "restricted area" to international aid workers and journalists, making it greatly difficult to supply aid to the victims.

However, in addition to national disaster management systems, there are other effective social mechanisms that can help to reduce the disaster risk. Scientists and practitioners who deal with the issue agree that, particularly in the first days after a disaster such as an earthquake, a flood or a cyclone, it is above all the informal aid provided in the local context and solidarity among people that are critical. In fact, most first aid is provided by family and neighborhood networks. In addition, almost all societies have coping and adaptation strategies at their disposal. In fact, many disasters are not single events; they occur every year and repeatedly reveal to the affected societies the need of developing coping and adaption strategies, such as a change in building design or the creation of evacuation plans.

Supporting, not replacing the State

The relief aid and development work faces immense challenges, given the coincidence of weak governance and extreme natural events. With which actors and institutions is collaboration possible in the event of a disaster? How can these actors be strengthened? Which tasks can be assumed by the government and which by civil society or private actors? It is certain that both government

and local civil society play a crucial role in disaster preparedness and that each must be strengthened accordingly.

Given the often severe corruption, the low capacities of the state and a virtually non-existent local civil society, it seems often easier for international public donors to entrust the funds earmarked for disaster preparedness and reconstruction after a disaster to international NGOs that implement their projects. However, this creates the danger of removing responsibility from the state and weakening it even more in the long term.

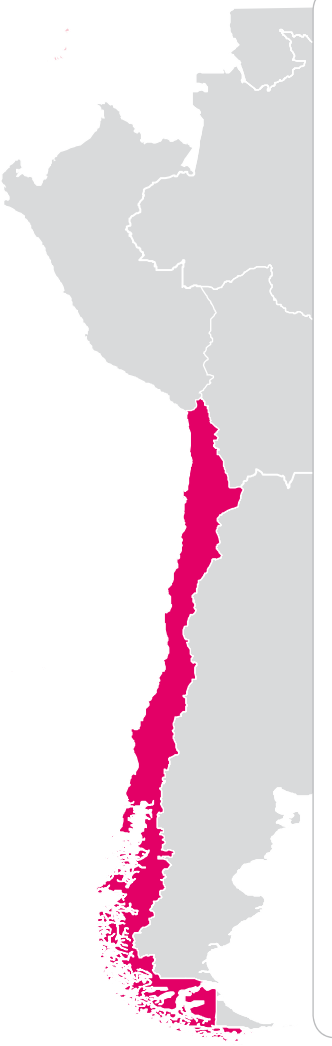
In Haiti, the risk of undermining state authority by the international community is currently real. Joel Boutroué, Adviser to the Haitian Prime Minister, pointed out at the Conference of the International Council of Voluntary Agencies (ICVA) in Geneva, Switzerland, in March 2011 that hardly any real cooperation between the Haitian Government and the international community is evident; instead, there is a climate of mistrust. Rather than closely accompanying the Government's work and taking common action, the promised government aid is handled through international NGOs or not even disbursed. This creates a vicious circle: the Government does not have the necessary financial resources to implement actions and therefore cannot demonstrate success, which in turn would be the prerequisite for gaining assertiveness and obtaining additional funds. Therefore, there is currently a real risk that the Haitian Government will be replaced by international NGOs in the implementation and planning processes.

Disaster risk reduction and disaster management in fragile states is undoubtedly a challenging task. However, it cannot be solved by undermining local state actors. As long as the concerned governments have a minimum level of development targets, they must be supported in close partnership in bilateral and multilateral development cooperation when they implement and execute development measures. More responsibility and more money must gradually be transferred to them. This can be successful if the governments are supported in setting up effective anti-corruption programmes. In addition, long-term plans to create local government capacities must be developed, training programmes set up, and the support of government officials by international experts guaranteed. According to the subsidiarity principle, which states that the higher and more remote level of government should only regulate what the lower level or the nearest level to the citizens cannot, it is important that local government structures in particular be strengthened. They must be allowed access to the institutions in charge of reconstruction and disaster preparedness.

Civil society as a lever to strengthen the state

Only when bilateral development cooperation is impossible because of gross human rights violations or extremely weak governance resources can be provided solely through NGOs. This approach, however, should remain temporary. An important function of NGOs is, in this case, also the strengthening of state structures in disaster preparedness. The member organizations of *Bündnis Entwicklung Hilft* achieve this by involving government officials in the planning processes and, with the help of their partner organizations, supporting the local population to actively demand state action in the field of disaster preparedness and beyond. Examples include the consideration of local government officials in local risk assessments or in planning and training processes, or the influence of national political processes and legislative procedures in disaster risk reduction.

In parallel to building state capacity, civil society's coping and adaptive capacities should be encouraged at the local level. If the government fails in disaster preparedness, then the catastrophic consequences of natural disasters can at least be mitigated at a lower level. The organizations that collaborate within *Bündnis Entwicklung Hilft* promote the already set up social, self-help strategies, for instance, by using traditional knowledge



Chile – a high performer

Shortly after the devastating earthquake in Haiti, another and even stronger earthquake hit Chile. This earthquake, with a magnitude of 8.8 points on the moment magnitude scale was the fifth strongest earthquake worldwide in over a hundred years. More than three million people live within 200 km of the epicentre of the earthquake. Even in Santiago de Chile, the capital located some 325 kilometres away, in many places in Argentina and even in São Paulo at a distance of a few thousand kilometres, the earthquake was still strongly felt. Despite its magnitude, the earthquake claimed only 562 victims (CRED EM-DAT 2011). The mortality rate was thus about 400 times lower than that of Haiti. A crucial difference was due to the good governance of Chile. Chile ranks 155th in the Failed States index of the Fund for Peace and is thus positioned on the diametrically opposed side of the spectrum from Haiti (The Fund for Peace 2011).

In particular, two dimensions of good governance are discussed in the literature for good disaster management: public sector efficiency and the good anti-corruption policy of the government. In 2009, Chile ranked 21st in the "Corruption Perception Index", ahead of Belgium, the United States and France. Since the 1960s, the government institutions have continuously established and enforced better building regulations. The stable building structure, at least of newer buildings, might be an important reason for the low number of deaths.

In addition, innovative technologies were established in disaster risk management and regular training sessions held in educational institutions. The fact that the tsunami caused by the earthquake claimed many lives was due to serious errors committed by the Marine Unit in early warning and the complete collapse of telephone and internet lines after the temporary failure of power supply (Kaufmann and Tessada 2010).

of construction design or pre-existing early warning systems and further developing them with local partner organizations.

These organizations also support communities that, for example, due to migration or abject poverty, have no disaster preparedness mechanisms by ensuring a common risk analysis, transferring knowledge and providing training, and supporting necessary preventive measures, such as dike reinforcements or salt-water sealing for water wells. (More examples are provided in Sections 3.2 and 3.3.)

The work of *Bündnis Entwicklung Hilft* is based on the assumption that, in the face of extreme natural events, only disaster risk management that is firmly rooted in local structures has a lasting effect.

3.2 Local risk management

Information rather than fear, early warning rather than surprise

Hotspot Sundarbans: Storm tides, cyclones, tides and floods – all of these occur in this region with a population of over four million, mostly poor Indians. How can charities help these extremely exposed people to better adapt to these threats? What role do local risk assessments play? How can the local government structure be supported? The programme of Welthungerhilfe Community-Based Disaster Risk Management (CBDRM) provides an answer.

The most famous inhabitant of the Sundarbans is the Royal Bengal Tiger. The approximately four million Indian inhabitants of the archipelago have mixed feelings of having the tigers living in their neighborhood. 102 islands of the largest mangrove forest in the world belong to India, of which 54 are inhabited; the rest are nature reserves. More than 100 people become victims of the tigers each year. Many die during the illegal honey-gathering or at the trophy-hunting in Sundarbans National Park, the wild-life reserve for the endangered predators. And yet, the tigers are just one of many threats facing the inhabitants of some 1,000 villages in the Sundarbans. The "tidal land", as the islanders call their home, must regularly cope with dangerous natural hazards: spring tides and storms in the Bay of Bengal; the tides and flooding of rivers after monsoon; and the snowmelt in the northern highlands. Farmers in particular suffer from the shifts of the seasons, severe droughts and the difficult cultivation of the soil. And if that were not enough: the mostly low-lying islands will be threatened by the rise of the sea level induced by climate change.

In combination with the socio-economic situation of the inhabitants, the region becomes a high-risk zone. More than 40 per cent of families live below the poverty line. Population growth exacerbates the situation: in 1951, there were only 1.2 million people living in the Sundarbans; in 1991, there were already 3.2 million; the fourth million mark is probably exceeded by now. Poor basic infrastructure and the inadequate disaster preparedness at the local level contribute to the increased risk: ferries, bridges and roads, as well as schools and health facilities are often lacking or crumbling.

The Indian Government is far away

At the national level in India, disaster preparedness is now an integral part of the Government's five-year plans. The country focuses more on prevention after bitter experiences: the severe cyclone in Orissa in 1999; the earthquake in Gujarat in 2001; the Indian Ocean tsunami in late 2004; the devastating floods in Bihar in 2008; and Cyclone Aila, which heavily hit the Sundarbans in 2009. Meanwhile, the National Disaster Management Authority (NDMA) and the National Institute of Disaster Management (NIDM) were established, and there are standards as well as research, knowledge exchange, publications and national conferences. But it still takes a long time from the five-year plan of the Government in New Delhi to trickle through federal authorities and parallel structures down to effective dike reinforcement on one of the Sundarbans islands.

Some of the main obstacles are the great quantitative challenges for the Indian State: on the 54 inhabited islands in the Sundarbans alone, there are dams and dikes for a total length of 2,200 km, which must be regularly maintained and repaired. And yet,

the necessary well-trained staff and equipment such as dredgers and boats to fulfill this task are lacking. This deficiency can also lead to corruption or delegating the problem to higher levels. India's biggest challenge in the field of civil protection and prevention is the sheer size of the subcontinent, combined with its climatic situation. Nearly 60 per cent of the land mass is likely to be hit by earthquakes; some 12 per cent (40 million ha) are prone to flooding. Of the total national territory, 8 per cent are threatened by storms, particularly the coasts.

Community analysis

In this situation, Community Based Disaster Risk Management (CBDRM), as conducted by the NGO Welthungerhilfe in many regions of India, can be an appropriate tool. Welthungerhilfe carries out numerous CBDRM projects in cooperation with its Indian partner organizations, including in the Sundarbans. The target group: communities that are heavily and often exposed to natural hazards, are insufficiently protected, and, due to their socio-economic situations, can barely cope with the consequences of extreme natural events or prepare for future events. The goal: equipping the municipalities, their representatives, bodies, residents and relevant authorities in a sustainable and self-responsible manner. Extreme forms of coping with the situation, such as migration to Kolkata, thus become unnecessary.

Risk assessments and prevention plans are developed with the help of committees, which are composed of volunteer representatives of the villages, its various groups and government representatives at the level of the block or the district. Through meetings and activities, the community is included in the analysis. Experiences, needs and concerns of the people directly involved are thus identified.

The risk analysis in the CBDRM process is a holistic approach that examines both hazards and the vulnerability of the target group. In addition to physical data, the actors collect social structure-related, but also motivation-related data. The basic data set includes the number of households in a community and details on house location, size, building materials used and the type of roof. The aggregated data provide an overview of the number of types of houses and their location in the village – and how exposed they are in each case. The assessment of physical assets can be extensive and detailed. It includes, among other things, data on communications, power supply and mobility. For example, in order to decide on whether an early warning system by telephone is useful, it must be known how many households have permanent access to electricity and telephone. In the area of social structure, data on education, health, social organization, etc. are collected. In particular, in health care, there is much potential for active disaster preparedness in the informal sector. Are there traditional midwives in the village? Are there Accredited Social Health Activists (ASHAs) or traditional healers? Even the collection of data on how many people are organized in self-helf groups (in particular women's self-help groups) is important for estimating coping capacities. In the analysis of motivation-related vulnerability of the village, qualitative interviews are helpful: How strong is the willingness for change? Do community members feel helplessly exposed to the

Ten keys to success of Community Based Disaster Risk Management (CBDRM)

1. Cooperation with local partners.
2. Fostering local ownership.
3. Using traditional, local knowledge.
4. Ensuring participatory learning and action.
5. Jointly evaluating risk data.
6. Writing down problems and solutions in an action plan.
7. Cross-linking local structures.
8. Bottom-up linking of local communities in their region.
9. Providing and storing information.
10. Institutionalising own initiative.

threatening forces of nature? Is there trust in the local government officials?

Maps and plans

In analyzing the situation, the population is actively involved working together, creating different maps. For example, the Transect Map shows the areas of the community that are located very low and are therefore particularly vulnerable, and the Social Resource Map (Figure 18), provides a clear overview of all facilities such as wells, roads, ponds, dams, rivers, as well as the location and type of fields and houses. This latter type of map can also include the results of the Well-Being Analysis, which divides households into categories. Due to a simple color code, the map will show at a glance if there is a poor neighborhood in the village or if there is a connection between the well-being category and the exposure to hazards in the village. The Institutional Linkage Map provides an overview of the institutions and their networking, and of the responsible entity in the event of a disaster. This set of maps and plans – large, graphically clear and written in the local language – is then presented in a plenary session and discussed. Here it becomes clear whether any data and information are missing. Equally important is the question whether everyone agrees with this view of things.

Similar to the creation of the maps, problem identification and risk assessment are carried out with the community in a participatory manner. The final result of this process is the action plan, the central framework for action. The action plan is also the crisis response plan in case of acute hazards and the community development plan for the ongoing development of the community in disaster preparedness. When does the CBDRM Committee meet? When do the helpers receive their training? Who in the village does what in the worst case scenario? The plan also determines future responsibilities in the various fields of action for the local disaster preparedness. A communications plan defines who informs whom about what and how. The action plan is a framework for action that has a long-term impact beyond the Welthungerhilfe project.

The completed action plan is publicly presented to the local self-government, the Panchayat Rai. This local self-government body approves the plan, which then becomes official. This helps the members of the Committee and the community to act with more confidence when dealing with regional officials and to gradually implement the plan. Problems can now be better formulated, documented and discussed – even in the regular coordination meetings at the block and district levels.

Sustainability and self-responsibility

The risk analysis and the action plan help the communities, even without the support of the central government, to bear in mind future natural hazards. To create sustainable awareness of the importance of prevention and adapting measures, materials such as posters, flyers, brochures, manuals as well as training sessions are used. The theme of disaster risk reduction can also be integrated into the village school curriculum; the community protection hall can be expanded into an information and training center. These centers can serve the community in many ways: access to government sources (meteorological data), the media, library and courses, and provision of information, for instance, on current market prices.

CBDRM projects not only build self-help capacity of the rural population, but they also have a political objective. Some communities, especially in remote and inaccessible islands, cannot easily intervene pro-actively with the regional and national authorities. Therefore, disaster management forums at the district level are part of the projects managed by Welthungerhilfe: with at least two representatives of each village committee, the project works at a higher level (municipality, district, federal state) on harmonizing and

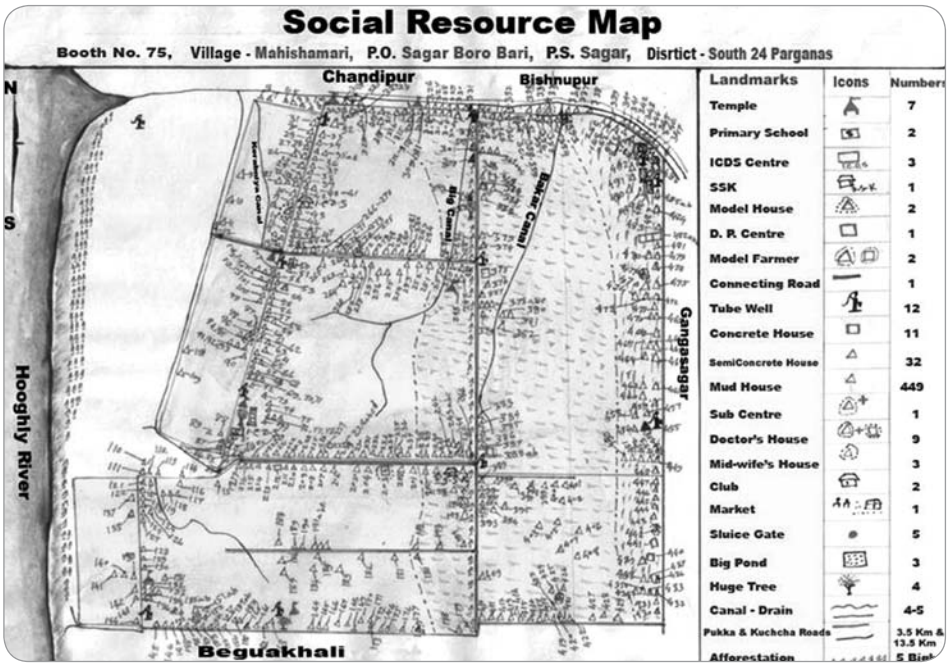


Figure 18: Simple village map, created by the CBDRM process

networking actors in disaster risk reduction. The goals include improved coordination with government institutions, joint studies and joint planning. In addition, the projects developed at the grassroots level can also contribute to "pressure from below" and give a voice and concrete arguments to the affected communities and their representatives when they deal with government officials. Indeed, the Sundarbans are located far from the mainland and compete for attention as well as for specific resources and services with many other areas of India.

Information rather than fear, early warning rather than surprise – the CBDRM concept aims to initiate a process, whose structures are self-sustained after the termination of the project. Through a high degree of mobilization and the participation and networking of people and organizations, the strategy aims to develop a collective sense of self-responsibility and confidence leading to a long-lasting commitment of the villagers.
The action plan becomes an instrument that can trigger further concrete activities and control disaster management in the worst of cases. As a result, the next storm or the next flood do not become disasters, but remain as they should be, natural events. And perhaps addressing the dangers of nature will also help the villagers to be better prepared for their next encounter with the Royal Bengal Tiger.

Action Plan

Mitigation work
To strengthen disaster protection, information is collected based on answers to the following: Is it necessary to repair dike sections? Do wells need salt-water sealing? Is resettlement of some families within the village needed? Are there high-lying escape routes? Is there a suitable refuge? Can the coastal erosion protection be improved by mangrove reforestation?

Disaster preparedness
To improve local disaster preparedness, task forces are formed. Each group has a particular competence and is trained accordingly: early warning, rescue and salvage, first aid, water supply. Under the leadership of the CBDRM Committee, the groups regularly practise their duties. Local clubs and women's groups organize emergency kits for each family that will ensure survival in the first days following a disaster: if necessary, residents have access to water-tight packaged food, toiletries, kitchen utensils as well as their most important documents.

Adaptation work
What can help the community to better cope in the future with extreme natural events and the consequences of climate change? Much progress can be achieved through advice and training, such as in the fields of flood-resistant or salt-water-resistant seeds, crop rotation and animal husbandry. Other options are to provide physical improvements to community infrastructure: existing or newly dug drinking water wells, for example, can be built and sealed so that no salt-water will penetrate.

3.3 Demanding state responsibility

If states fail, if governments do not fulfill their tasks, this becomes a risk for the population. This applies as a general rule and similarly to the risk posed by extreme natural events. Demanding state disaster preparedness can thus be a matter of survival. Contributing locally to this preparedness is a task of the members of *Bündnis Entwicklung Hilft* and its partners.

For state disaster preparedness, the first requirement is political will. The government and the administrative authorities need incentives to act or react (UNISDR 2011), which can be political, economic, legal, administrative or moral/ethical and which can imply and reinforce each other. Since governments and representatives usually are interested in their re-election, political incentives have the most direct effect. Often, it is the pressure of the population or their being affected by a terrible disaster that leads to actions by policymakers (Wisner et al. 2011).

Opportunities for influence and incentives
Governments will plan disaster preparedness when faced with public pressure or when such actions would lead to increasing the prestige of its leaders, i.e. when the decision makers have one of the above-mentioned incentives to act; this applies equally to local bodies and authorities.

For civil society organizations, it is therefore an important strategy to exert political pressure and in particular contribute to enable the affected people to voice their needs and demands. Exchanges with the political leaders – at the local, regional and national levels – can help to create an understanding on the part of authorities and political bodies about the living conditions, in particular of the most vulnerable population groups. Especially for decision makers who must face elections, contact with the population and their request for action are major political

Case study: Bangladesh

Civil society calls for the State

Bangladesh is highly vulnerable to disasters: there are annual floods and cyclones, erosion and salinization in the coastal regions, and drought periods in the winter months. Bangladesh is one of the countries of the global south that is most severely affected by the consequences of global climate change. This is mainly due to its exposed location between the slopes and precipices of the Himalayas and the Bay of Bengal. Due to poverty and high population density, the social consequences of climate change will be severe. Much of the land area is only a few metres above sea level, and the entire coastal area is extremely densely populated.

In collaboration with its partners, the NGO Brot für die Welt implements extensive measures in Bangladesh. Some of their tasks include ensuring improved access to government services, information and mobilization of the population and initiating dialogue with local, regional and national authorities. In addition, Brot für die Welt provides information for politicians on the problems and potentials in the project region, deficits in the performance of state functions as well as best practices of local adaptation measures and climate protection. Furthermore, the NGO engages in continuous collection and analysis of experiences and relevant data, it conducts studies and research projects and participates in national and international networks – an essential prerequisite to building political pressure.

The partner CCDB has set the goal to reduce disaster susceptibility of communities and

to enable the population in the project area to undertake further initiatives to reduce the vulnerability of communities in case of disasters. This includes also civil society demands for the right to protection against extreme natural hazards. Lobbying for and influencing policies at the local level play an important role in this context. The request for protection rights assumes that people are informed and know their rights. Ensuring this is also part of the project: for example provding information to schools and local councils and mobilizing target groups. It is essential in this context to provide comprehensive information to students on their rights.

The measures taken in previous years have already led to a mobilization of the population; their houses were reinforced wind barriers and flood-protected seed stores were erected. Climate has become a main topic in many local councils. There were demonstrations and campaigns in which people demanded a right to protection and prevention. Through the NCCB network, the partners of Brot für die Welt create political pressure at the national level. For example, they demand the full implementation of the National Action Programme on Adaptation (NAPA) and the subsequent agreements. A core element of the demands is the involvement of civil society in the planning and implementation of adaptation measures.

incentives. If the introduced improvements in the context of disaster risk reduction also lead to long-term cost savings due to the fact that natural events cause less severe damages and fewer efforts are needed to cope with these events, then they also stimulate economic and administrative incentives.

In addition to creating a legal basis, the necessary financial resources for disaster risk reduction must be made available, and thus a request for state action is needed in the long term. Indeed, it has to be monitored that the agreed or promised measures are being implemented and the financial resources provided, and, if necessary, the respective governments must be requested to hold their promise time and again.

A right to protection

When the boundaries of political will and incentives are reached, the basic legal principles – national or international – become very important. If the right to protection were enshrined in legislation, measures to face the increasing threat from extreme natural events as well as disaster preparedness would have to be implemented more seriously than up to now. If necessary, they could be demanded by the endangered or affected population on the basis of an enforceable right.

The essential basis for such an approach is the Universal Declaration of Human Rights – adopted by the General Assembly of the United Nations on 10 December 1948, in particular, Articles 3 and 25. Article 3: *Everyone has the right to life, liberty and security of person; Article 25: Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of liveli-*

hood in circumstances beyond his control. Motherhood and childhood are entitled to special care and assistance. All children, whether born in or out of wedlock, shall enjoy the same social protection (United Nations 1948).

Governments have the responsibility to protect and to guarantee the human rights of their citizens. If a state is unable to offer sufficient protection to its citizens, then in special cases this responsibility can be transferred to the international community. To date, there is no such international responsibility for disasters or the effects of climate change such as sea level rise. However, this must be a fundamental approach for the prevention and management of disasters. Indeed, an internationally recognized responsibility commits all state institutions, both at the national level and within the framework of international or supranational structures, in order to protect their citizens.

If an international agreement to legally protect people before and during disasters is concluded and ratified, it must be transposed into national laws and regulations. These regulations include, among other measures, those that inform citizens about legislation and the ways of claiming their rights.

Guidelines and standards in the field of disaster relief such as the Code of Conduct of the International Red Cross/Red Crescent, and the principles of the Humanitarian Charter of the SPHERE project can be used as starting point to place the right to protection into the foreground or to declare it as the basis for action. This also applies to many standards that have been established at local, regional or national levels. In the future, they might serve as a framework to enshrine a human rights approach in the disaster preparedness and response.
Part of this is that people are entitled to sup-

Case study: Zimbabwe

The right to health

Each year, cholera breaks out in Zimbabwe. Only a few people have access to clean water, and there are threats of severe flooding at the beginning of the rainy season. Rivers and lakes are polluted by garbage and raw sewage – ideal conditions for cholera. The severe cholera epidemic in 2008, when nearly 100,000 people fell ill, surprisingly broke out in the dry season; 3,500 people died from severe diarrhoea, although cholera is treatable when good health care is available. But after the collapse of the health system in the 1990s due to political mismanagement, the situation has continuously worsened and diseases such as typhoid and cholera, which could be prevented by simple measures such as providing clean water and hygiene measures, are spreading even further. The Community Working Group on Health (CWGH) combats the dramatic situation in the country. Its name refers to the central role of civil society in this process: due to its basic structure, the organization is well-established at the local level and promotes a strong grassroots mobilization at the national level. Twenty-five regional health committees provide the public with the tools and knowledge to actively participate in improving their situation. During the cholera epidemic of 2008, the committees were helped by their health centres in rural areas to inform people about preventive measures and to preventively distribute hygienic supplies to combat the further spread of the disease.

The CWGH activists engage not only in emergency relief but also on political work: They criticise publicly the lack of commitment by the Government and demand a guaranteed social assistance for people in emergency and disaster situations. Itai Rusike, the Director of CWGH, stated: "The health crisis comes from wider economic collapse and the increasing extent to which people are lacking access to basic public services like education, transport, water and electricity. Zimbabweans are not numbers of cholera cases or fatalities. We are people who have responded to an increasingly difficult situation, who are entitled to health as a right and who should be central in any response and rehabilitation of our system."

In the coming years, with the support of Medico International, Community Working Group on Health (CWGH) intends to expand, the health committees to other municipalities in the country. Despite all the restrictions and repressions of the Government of Robert Mugabe, CWGH is working towards the political advancement of the concept of basic health care. It requests the Government to provide nationwide coverage of the population with the necessary medicine and the fair distribution of resources. Also, with the support of an international health network, CWGH is committed to include the right to health in the new constitution of Zimbabwe. Thus,disaster preparedness in the health sector could be legally enforceable, according to their vision of the future.

port, that they should know the standards of assistance and that they have institutionally enshrined possibilities to claim their needs and support (Kent 2011).

In order to be able to participate self-consciously in political processes, the public access to information is of high importance. People who want to claim prevention and protection must have a minimum level of knowledge. The information policy of governments and local authorities is just as important as media coverage. If disasters are not portrayed as inevitable, and if disaster prevention and the prevention of suffering are given different priority, the respective policy measures will gain a different emphasis. For the purposes of the above incentives, political action can be initiated or facilitated.

Demand for government action

The members of *Bündnis Entwicklung Hilft* work together with their partners to support individuals who are especially prone to disasters and provide them with possibilities to exercise their rights and claim government action. Three examples from the project work of the alliance members illustrate this (see the boxes at the margin of these pages).

Case study: the Philippines

Disaster prevention and advocacy work are mutually reinforcing

The Philippines, with its exposed position in the Pacific Ocean and its 7,000 islands, is heavily affected by extreme natural events. Storms and heavy rains hit degraded ecosystems: destroyed coral reefs and mangrove forests, depleted soils and deforested areas. Thus, there are few natural bulwarks against the threat of disasters. People also feel the effects of climate change. The high variability in precipitation increases. Storms become increasingly intense and lead salty sea water onto the fields and into the groundwater, which damages the soil and food crops. Partner organizations of MISEREOR support small-scale farmers in securing their land rights, cultivating their fields in an appropriate and sustainable manner, and protect the coasts and forests which significantly reduces the vulnerability of people in rural areas. But even the urban poor are severely affected by natural hazards – particularly floods. Those who live close to streams and rivers without land rights are particularly vulnerable. COPE, the local partner of Misereor, successfully defends the rights of the urban poor to stay and live in their area, which is an important prerequisite in order for them to be considered in disaster preparedness and environmental protection.

However, extensive disaster preparedness plans, which could effectively have positive results in extreme natural events, are lacking at the local, regional and national levels. For this reason, for COPE and other NGOs, lobbying is as important as concrete practice in the communities. Community groups and organizations are trying to create a new culture of accountability. Good framework conditions are provided by the Local Government Code, creating a subsidiary planning and decision-making structure for public affairs, which are as close as possible to all potentially affected citizens. The law came into force in the Philippines in 1991; it provides for many direct consulting mechanisms and gives citizens, community groups, NGOs, business representatives inter alia the opportunity to submit proposals. Although the law has been in force for 20 years, its possibilities are still underused. In the field of disaster risk reduction (DRR) in particular, it is essential to take into account all sectors and experiences. This has been done successfully in recent years: since 1997, civil society organizations, including COPE, have joined Disaster Risk Reduction Network Philippines (DRRNetPhils) and continue to work hard towards a comprehensive national DRR strategy.

Since 2010, the Philippines has successfully adopted the Disaster Risk Reduction and Management Act. The adoption was preceded by a fruitful dialogue between the participating organizations, the Government and its ministries, and policy-makers as well as the Congress and the Senate. DRRNetPhils commented and improved every new draft from a practical perspective, and simultaneously tried to gain supporters at all levels for the legislative initiative. Achievements in field work helped greatly in gaining support for the law. A practical example is the comprehensive strategy agreed on between civil society, NGOs and government agencies in the city of Dagupan in northern Luzon. When in 2009, Hurricane Parma caused the worst floods in history, the efforts proved worthwhile: all 150,000 inhabitants survived as a result of good prevention plans. In other cities, however, there were many casualties. The actors involved in the improvement could also share their experiences at the government level and thus provide further impetus for the Disaster Risk Reduction and Management Act.

4. Conclusions and perspectives

Extreme natural events do not necessarily turn into disasters. The WorldRiskReport shows that the disaster risk is always made up of two components: exposure to natural hazards and climate change, and social vulnerability. Thus, the report makes it clear that disasters are not solely due to meteorological or geological phenomena, but are also caused by social structures and processes within a society. The Netherlands, Greece and Hungary for example, are relatively high exposed to extreme natural events, but as a result of their social, economic and environmental situation, they are comparatively well-ranked in the list of the WorldRiskReport.

Reality is too complex to be accurately represented by a global index. However, the maps and selected indicators of the WorldRiskIndex allow conclusions to be made about the significance of the studied factors on a global scale. For effective practices in humanitarian assistance and development cooperation, the WorldRiskIndex provides information and arguments; threats can be detected early, individual needs determined more accurately, political claims made and measures taken in the affected countries and in donor countries when based on comprehensive analysis.

The reduction of social vulnerability (e.g. by reducing poverty), the promotion of better coping capacities (e.g. through good governance and strengthening of social networks) and the strengthening of adaptive capacities (e.g. through education) are realistic options for actions in reducing risk and thus can help to prevent future disasters and crises.

Also, the analysis of regional hotspots (illustrated by the example of Indonesia) provides an important basis for prevention-oriented humanitarian aid and development cooperation. Small-scale analysis, in particular, supplemented by local and regional reports and lessons learned, can lead to concrete recommendations for action. When required, precautionary measures, protection of vulnerable groups and risk management can be directly implemented by aid agencies without needing to wait for the necessary changes in the policy framework.

From the analysis and results of the WorldRiskReport it is possible to draw **key recommendations and requests** relative to the analyzed components and topics:

Exposure

+ In order to meet its responsibilities, the international community must guarantee that natural hazards will not increase beyond the unavoidable level. Global warming must be limited to below 2°C. The voluntary commitments made by governments are currently aiming at a temperature rise by 3.5 to 4°C. In order to limit global warming to 2°C above pre-industrial levels, by the middle of the century, the economies of developed countries must reduce emissions to a minimum. Worldwide reduction in emissions of greenhouse gases by 85 per cent in 2050 over the 2000 levels must be guaranteed.

+ Emerging and developing countries will not be able to follow the development path of developed countries, which was based on the use of fossil fuels. Therefore, developed countries must provide financial and technical support to the developing and emerging countries to induce a climate-friendly development.

Susceptibility

+ Poverty in particular determines whether people suffer losses from natural hazards. Both, individual poverty and the poverty of countries, is crucial. To reduce disaster risks, poverty reduction must therefore be at the heart of all strategies at all levels.

+ In particular, structural reforms are necessary to address the causes and not just the manifestation of poverty such as democratic and land reforms as well as decentralization processes are required. At the international level, the solution to the debt crisis and the establishment of a fair world trading system that is ecologically and socially sustainable needs to be advanced more vigorously.

Coping capacities

+ The international obligations in the Hyogo Framework for Action are the foundation of disaster risk management, to which the

signatory states have committed themselves. Now, they have to implement these commitments and report reliably on the national implementation.

+ Disaster risk reduction needs to be enshrined as a cross-cutting issue in development programmes and projects of development cooperation. Also, in the strategic planning of development cooperation and foreign policy, a coherent approach to the integration of disaster risk reduction must be included.

Adaptive measures

+ The financial resources for disaster preparedness should be increased substantially, given the rising number of disasters and the consequent damages, in addition to regular development cooperation. Moreover, the financial instruments for disaster risk reduction must be adapted to the needs, among others through appropriate project timelines and funding periods. For a sustainable and programmatic work in collaboration with the local civil societies and the state officials, significantly longer planning periods are necessary.

+ Better coordination and enforcement are required in the various policy areas, such as education and the environment. This includes improving coordination between development cooperation, humanitarian assistance and environmental policy (for example, the consideration of disaster risk reduction as part of climate adaptation strategies) and between countries in their adaptive measures.

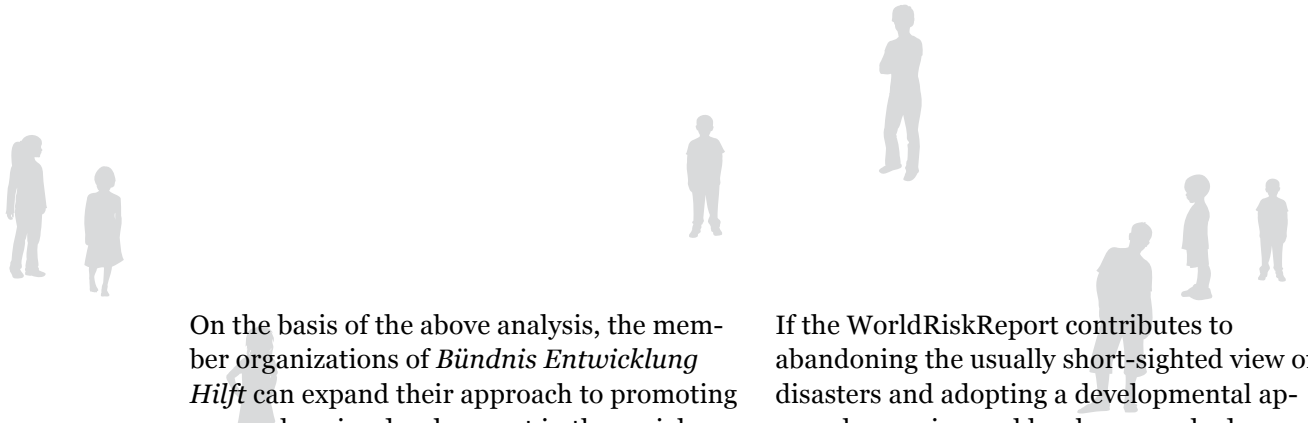
Governance and civil society

+ Governmental and non-governmental development cooperation must always work towards sustainability, thus towards making itself redundant. This applies also to the field of disaster risk reduction. The responsibility of national governments in the field of disaster risk reduction, particularly in high-risk countries, must therefore be strengthened. In particular, in the context of weak governance, it is essential to support national governments, even before the occurrence of a disaster, in order to develop capacities and their responsibilities for protection.

+ The current practice of the international community, i.e. to be supportive only when the disaster has already occurred, is not helpful, especially in terms of local ownership. In order to achieve sustainable results, long-term, pro-active engagement and compulsory perspectives are required. Disaster risk reduction begins long before a natural hazard occurs.

+ Often, in the event of a disaster, measures are implemented exclusively by external actors, due to misunderstood efficiency criteria. National governments and civil society are undermined or replaced. The result is a further loss of legitimacy of the government, and a lack of perspective, and of coping and adaptive capacities. To avoid this mechanism, the subsidiarity principle requires that, in particular, local governmental structures must be encouraged, including local civil society.

+ To ensure that national governments of countries at risk take responsibility for the protection of the population, disaster risk reduction should be legally enshrined by an international agreement. This agreement could provide for specific legal claims by the national legislation of those countries that sign and ratify the agreement. Thus, civil society would have at its disposal an important advocacy tool with which it could call on governments to account for their responsibility to protect.



On the basis of the above analysis, the member organizations of *Bündnis Entwicklung Hilft* can expand their approach to promoting comprehensive development in the social, economic and cultural dimensions. Combating the causes of poverty, hardship and conflict, and strengthening local partners and their resources contribute to reducing the vulnerability of people and hence their disaster risk. The same applies to the challenges caused by climate change. Development, if understood and managed in this way, is the best form of disaster risk reduction and ultimately leads to reducing individuals' susceptibility to extreme natural events and climate change and, by strengthening local coping capacities, leads to mitigating the consequences for all affected people.

By strengthening coping and adaptive capacities, the project partners with whom the aid agencies collaborate can contribute to achieving social change in their societies and provide and secure greater opportunities to disadvantaged people and communities. Examples for such projects include measures that contribute to the awareness-raising on the danger of living in risky conditions and settlement patterns, or projects related to education and the environment that support opportunities for participation in public life and require the participation of all population groups. Reducing vulnerability can achieve far more positive effects than purely technical improvements and thus reducing the likelihood of disasters. This can contribute to social development and equal opportunities, such as is repeatedly promoted and demanded by *Bündnis Entwicklung Hilft*.

If the WorldRiskReport contributes to abandoning the usually short-sighted view of disasters and adopting a developmental approach, a major goal has been reached.

Country	WRI (%)	(Rank)
Afghanistan	14.06	(15.)
Albania	9.98	(39.)
Algeria	8.06	(61.)
Angola	8.02	(62.)
Argentina	3.77	(130.)
Armenia	6.90	(84.)
Australia	4.28	(119.)
Austria	3.41	(144.)
Azerbaijan	6.80	(88.)
Bahamas	4.52	(118.)
Bahrain	1.66	(169.)
Bangladesh	17.45	(6.)
Barbados	2.44	(161.)
Belarus	2.98	(149.)
Belgium	3.51	(140.)
Belize	5.93	(102.)
Benin	10.90	(36.)
Bhutan	13.65	(18.)
Bolivia	5.16	(112.)
Bosnia and Herzegovina	6.25	(97.)
Botswana	5.56	(108.)
Brazil	4.26	(121.)
Brunei Darussalam	14.08	(14.)
Bulgaria	4.08	(127.)
Burkina Faso	11.58	(29.)
Burundi	11.56	(30.)
Cambodia	16.58	(9.)
Cameroon	10.27	(38.)
Canada	2.57	(159.)
Cape Verde	9.47	(44.)
Central African Rep.	7.18	(77.)
Chad	12.25	(22.)
Chile	11.97	(25.)
China	6.36	(95.)
Colombia	6.86	(86.)
Comoros	6.93	(83.)
Congo, Republic of	7.71	(68.)
Costa Rica	16.74	(8.)
Croatia	3.71	(134.)
Cuba	5.99	(101.)
Cyprus	3.46	(141.)
Czech Rep.	4.15	(123.)
Denmark	2.86	(152.)
Djibouti	7.05	(80.)
Dom. Republic	12.00	(24.)
Ecuador	8.69	(54.)
Egypt	2.38	(162.)
El Salvador	16.49	(10.)
Equatorial Guinea	6.72	(89.)
Eritrea	7.22	(76.)

Country	WRI (%)	(Rank)
Estonia	2.25	(165.)
Ethiopia	8.27	(60.)
Fiji	13.57	(19.)
Finland	2.06	(166.)
France	2.76	(155.)
Gabon	6.30	(96.)
Gambia	13.90	(17.)
Georgia	6.97	(81.)
Germany	2.96	(150.)
Ghana	9.35	(46.)
Greece	7.09	(79.)
Grenada	2.29	(163.)
Guatemala	20.88	(5.)
Guinea	9.49	(43.)
Guinea-Bissau	13.12	(20.)
Guyana	9.02	(52.)
Haiti	11.45	(32.)
Honduras	12.10	(23.)
Hungary	5.49	(109.)
Iceland	1.56	(170.)
India	7.68	(71.)
Indonesia	11.69	(28.)
Iran	5.11	(114.)
Iraq	5.77	(105.)
Ireland	4.15	(122.)
Israel	2.60	(158.)
Italy	4.74	(117.)
Côte d'Ivoire	9.03	(51.)
Jamaica	12.89	(21.)
Japan	11.13	(35.)
Jordan	5.13	(113.)
Kazakhstan	4.04	(128.)
Kenya	7.82	(67.)
Kiribati	1.88	(168.)
Kuwait	3.71	(135.)
Kyrgyzstan	8.48	(58.)
Lao PDR		5.80
Latvia	3.09	(147.)
Lebanon	5.01	(115.)
Lesotho	7.86	(64.)
Liberia	9.20	(49.)
Libya	3.67	(136.)
Lithuania	2.89	(151.)
Luxembourg	2.70	(156.)
FYR Macedonia	5.86	(103.)
Madagascar	14.46	(13.)
Malawi	8.99	(53.)
Malaysia	6.69	(91.)
Mali	11.51	(31.)
Malta	0.72	(172.)
Mauritania	9.70	(41.)
Mauritius	11.91	(26.)
Mexico	6.53	(93.)

Country	WRI (%)	(Rank)
Moldova	4.78	(116.)
Mongolia	3.43	(142.)
Morocco	7.17	(78.)
Mozambique	9.98	(40.)
Myanmar	8.54	(57.)
Namibia	6.63	(92.)
Nepal	6.15	(99.)
Netherlands	7.71	(69.)
New Zealand	4.28	(120.)
Nicaragua	15.74	(11.)
Niger	14.03	(16.)
Nigeria	9.03	(50.)
Norway	2.28	(164.)
Oman	2.80	(154.)
Pakistan	7.84	(66.)
Panama	7.70	(70.)
Papua New Guinea	15.45	(12.)
Paraguay	4.12	(125.)
Peru	7.24	(75.)
Philippines	24.32	(3.)
Poland	3.42	(143.)
Portugal	3.62	(137.)
Qatar	0.02	(173.)
Romania	6.43	(94.)
Rwanda	8.68	(55.)
Russian Fed.	3.56	(139.)
Samoa	7.88	(63.)
São Tomé and Princ.	3.73	(131.)
Saudi Arabia	1.26	(171.)
Senegal	11.76	(27.)
Serbia	5.44	(110.)
Seychelles	2.68	(157.)
Sierra Leone	11.25	(33.)
Singapore	2.85	(153.)
Slovak Republic	3.38	(145.)
Slovenia	3.72	(132.)
Solomon Islands	23.51	(4.)
South Africa	5.71	(107.)
Republic of Korea	4.14	(124.)
Spain	3.29	(146.)
Sri Lanka	7.84	(65.)
Sudan	9.25	(48.)
Suriname	9.25	(47.)
Swaziland	7.37	(74.)
Sweden	2.00	(167.)
Switzerland	2.55	(160.)
Syria	6.19	(98.)
Tajikistan	7.47	(73.)
Tanzania	8.64	(56.)
Thailand	6.86	(85.)

Country	WRI (%)	(Rank)
Timor-Leste	17.45	(7.)
Togo	10.40	(37.)
Tonga	29.08	(2.)
Trinidad and Tobago	6.70	(90.)
Tunisia	5.72	(106.)
Turkey	5.38	(111.)
Turkmenistan	6.95	(82.)
Uganda	7.57	(72.)
Ukraine	3.02	(148.)
United Arab Emirates	4.09	(126.)
United Kingdom	3.61	(138.)
Uruguay	3.94	(129.)
United States of America	3.72	(133.)
Uzbekistan	9.37	(45.)
Vanuatu	32.00	(1.)
Venezuela	6.11	(100.)
Vietnam	11.21	(34.)
Yemen	6.83	(87.)
Zambia	8.41	(59.)
Zimbabwe	9.63	(42.)

Countries not listed in the WorldRiskIndex

Andorra
Antigua and Barbuda
Democratic People's Republic of Korea
Democratic Republic of the Congo
Dominica
Federated States of Micronesia
Liechtenstein
Maldives
Marshall Islands
Monaco
Montenegro
Nauru
Palau
San Marino
Somalia
St. Kitts and Nevis
St. Lucia
St. Vincent and the Grenadines
Tuvalu

Rank	Country	WorldRiskIndex	Exposure	Vulnerability	Susceptibility	Lack of coping capacities	Lack of adaptive capacities
1.	Vanuatu	32.00 %	56.33 %	56.81 %	37.14 %	79.34 %	53.96 %
2.	Tonga	29.08 %	56.04 %	51.90 %	28.94 %	81.80 %	44.97 %
3.	Philippines	24.32 %	45.09 %	53.93 %	34.99 %	82.78 %	44.01 %
4.	Solomon Islands	23.51 %	36.40 %	64.60 %	44.11 %	85.95 %	63.74 %
5.	Guatemala	20.88 %	38.42 %	54.35 %	35.36 %	77.83 %	49.87 %
6.	Bangladesh	17.45 %	27.52 %	63.41 %	44.96 %	86.49 %	58.77 %
7.	Timor-Leste	17.45 %	25.97 %	67.17 %	52.42 %	89.16 %	59.93 %
8.	Costa Rica	16.74 %	42.39 %	39.50 %	21.96 %	63.39 %	33.14 %
9.	Cambodia	16.58 %	26.66 %	62.18 %	48.28 %	86.43 %	51.81 %
10.	El Salvador	16.49 %	32.18 %	51.24 %	30.55 %	75.35 %	47.82 %
11.	Nicaragua	15.74 %	27.64 %	56.94 %	41.23 %	83.00 %	46.59 %
12.	Papua New Guinea	15.45 %	23.26 %	66.41 %	50.04 %	84.83 %	64.36 %
13.	Madagascar	14.46 %	20.68 %	69.91 %	67.51 %	85.65 %	56.57 %
14.	Brunei Darussalam	14.08 %	36.28 %	38.83 %	13.48 %	66.06 %	36.93 %
15.	Afghanistan	14.06 %	18.45 %	76.19 %	61.09 %	93.94 %	73.55 %
16.	Niger	14.03 %	18.49 %	75.86 %	69.38 %	89.54 %	68.65 %
17.	Gambia	13.90 %	22.20 %	62.63 %	45.29 %	83.99 %	58.62 %
18.	Bhutan	13.65 %	24.63 %	55.42 %	34.56 %	79.02 %	52.67 %
19.	Fiji	13.57 %	25.87 %	52.48 %	36.32 %	76.44 %	44.67 %
20.	Guinea-Bissau	13.12 %	18.53 %	70.84 %	59.51 %	89.76 %	63.26 %
21.	Jamaica	12.89 %	28.11 %	45.85 %	26.32 %	71.39 %	39.83 %
22.	Chad	12.25 %	16.30 %	75.14 %	64.28 %	94.36 %	66.78 %
23.	Honduras	12.10 %	21.81 %	55.50 %	37.61 %	80.03 %	48.85 %
24.	Dominican Republic	12.00 %	24.91 %	48.17 %	30.83 %	73.55 %	40.14 %
25.	Chile	11.97 %	31.25 %	38.31 %	21.86 %	55.89 %	37.19 %
26.	Mauritius	11.91 %	29.59 %	40.24 %	19.57 %	60.08 %	41.08 %
27.	Senegal	11.76 %	18.70 %	62.90 %	49.02 %	81.99 %	57.68 %
28.	Indonesia	11.69 %	20.49 %	57.06 %	37.66 %	83.31 %	50.20 %
29.	Burkina Faso	11.58 %	16.92 %	68.46 %	56.92 %	86.37 %	62.09 %
30.	Burundi	11.56 %	16.09 %	71.82 %	63.88 %	90.68 %	60.89 %
31.	Mali	11.51 %	16.59 %	69.35 %	54.74 %	85.45 %	67.85 %
32.	Haiti	11.45 %	15.95 %	71.77 %	64.03 %	89.46 %	61.83 %
33.	Sierra Leone	11.25 %	15.31 %	73.50 %	64.79 %	89.09 %	66.62 %
34.	Vietnam	11.21 %	22.02 %	50.89 %	30.82 %	78.88 %	42.97 %
35.	Japan	11.13 %	39.57 %	28.13 %	16.30 %	36.66 %	31.44 %
36.	Benin	10.90 %	16.20 %	67.24 %	54.87 %	84.90 %	61.94 %
37.	Togo	10.40 %	14.98 %	69.45 %	58.26 %	87.49 %	62.59 %
38.	Cameroon	10.27 %	16.23 %	63.29 %	47.62 %	85.82 %	56.42 %
39.	Albania	9.98 %	22.47 %	44.42 %	20.04 %	74.31 %	38.91 %
40.	Mozambique	9.98 %	13.86 %	71.95 %	68.19 %	86.16 %	61.52 %
41.	Mauritania	9.70 %	14.57 %	66.59 %	49.00 %	85.79 %	64.99 %
42.	Zimbabwe	9.63 %	14.30 %	67.33 %	55.70 %	89.03 %	57.26 %
43.	Guinea	9.49 %	13.35 %	71.13 %	58.49 %	92.13 %	62.79 %
44.	Cape Verde	9.47 %	17.25 %	54.86 %	39.52 %	76.86 %	48.20 %
45.	Uzbekistan	9.37 %	17.28 %	54.25 %	33.17 %	77.07 %	52.51 %
46.	Ghana	9.35 %	15.67 %	59.66 %	48.25 %	77.10 %	53.63 %
47.	Suriname	9.25 %	19.52 %	47.40 %	28.84 %	73.82 %	39.53 %
48.	Sudan	9.25 %	13.71 %	67.44 %	51.62 %	90.90 %	59.80 %
49.	Liberia	9.20 %	12.71 %	72.33 %	67.59 %	86.37 %	63.02 %
50.	Nigeria	9.03 %	13.41 %	67.37 %	54.94 %	86.93 %	60.24 %
51.	Côte d'Ivoire	9.03 %	14.50 %	62.27 %	48.39 %	77.24 %	61.19 %
52.	Guyana	9.02 %	17.85 %	50.55 %	29.57 %	76.90 %	45.18 %
53.	Malawi	8.99 %	13.73 %	65.48 %	56.63 %	86.05 %	53.76 %
54.	Ecuador	8.69 %	18.13 %	47.97 %	27.63 %	76.94 %	39.35 %
55.	Rwanda	8.68 %	13.72 %	63.32 %	59.00 %	83.11 %	47.84 %
56.	Tanzania	8.64 %	12.91 %	66.97 %	65.43 %	83.03 %	52.46 %
57.	Myanmar	8.54 %	14.47 %	59.02 %	41.67 %	79.75 %	55.62 %
58.	Kyrgyzstan	8.48 %	17.09 %	49.63 %	28.29 %	76.16 %	44.43 %
59.	Zambia	8.41 %	12.89 %	65.27 %	61.63 %	81.72 %	52.47 %
60.	Ethiopia	8.27 %	11.64 %	71.05 %	63.11 %	87.11 %	62.92 %

Rank	Country	WorldRiskIndex	Exposure	Vulnerability	Susceptibility	Lack of coping capacities	Lack of adaptive capacities
61.	Algeria	8.06 %	16.51 %	48.80 %	22.89 %	76.36 %	47.14 %
62.	Angola	8.02 %	12.88 %	62.28 %	53.64 %	82.84 %	50.35 %
63.	Samoa	7.88 %	14.95 %	52.69 %	30.49 %	79.85 %	47.73 %
64.	Lesotho	7.86 %	12.46 %	63.12 %	52.04 %	83.46 %	53.86 %
65.	Sri Lanka	7.84 %	15.05 %	52.14 %	29.49 %	81.02 %	45.91 %
66.	Pakistan	7.84 %	12.27 %	63.84 %	40.33 %	86.61 %	64.58 %
67.	Kenya	7.82 %	11.90 %	65.75 %	54.51 %	87.60 %	55.14 %
68.	Congo, Republic of	7.71 %	12.19 %	63.28 %	50.98 %	87.39 %	51.45 %
69.	Netherlands	7.71 %	29.24 %	26.37 %	13.99 %	38.71 %	26.42 %
70.	Panama	7.70 %	17.27 %	44.56 %	30.57 %	67.17 %	35.94 %
71.	India	7.68 %	12.68 %	60.55 %	45.30 %	80.11 %	56.24 %
72.	Uganda	7.57 %	11.68 %	64.87 %	54.80 %	86.94 %	52.86 %
73.	Tajikistan	7.47 %	13.56 %	55.11 %	37.44 %	75.62 %	52.28 %
74.	Swaziland	7.37 %	11.98 %	61.56 %	48.56 %	83.10 %	53.02 %
75.	Peru	7.24 %	15.08 %	47.99 %	31.75 %	74.86 %	37.36 %
76.	Eritrea	7.22 %	9.90 %	72.88 %	67.17 %	87.68 %	63.79 %
77.	Central African Republic	7.18 %	9.91 %	72.42 %	63.34 %	91.20 %	62.72 %
78.	Morocco	7.17 %	13.41 %	53.49 %	29.72 %	77.12 %	53.64 %
79.	Greece	7.09 %	20.89 %	33.94 %	16.22 %	53.29 %	32.32 %
80.	Djibouti	7.05 %	11.14 %	63.29 %	40.08 %	83.56 %	66.22 %
81.	Georgia	6.97 %	15.11 %	46.15 %	25.37 %	66.97 %	46.12 %
82.	Turkmenistan	6.95 %	13.77 %	50.44 %	21.64 %	79.27 %	50.43 %
83.	Comoros	6.93 %	10.10 %	68.60 %	51.13 %	85.92 %	68.75 %
84.	Armenia	6.90 %	14.67 %	47.01 %	26.27 %	70.11 %	44.64 %
85.	Thailand	6.86 %	14.84 %	46.25 %	22.44 %	76.23 %	40.10 %
86.	Colombia	6.86 %	14.00 %	49.03 %	30.81 %	75.75 %	40.52 %
87.	Yemen	6.83 %	10.23 %	66.76 %	47.30 %	87.27 %	65.70 %
88.	Azerbaijan	6.80 %	13.90 %	48.94 %	32.64 %	68.01 %	46.16 %
89.	Equatorial Guinea	6.72 %	11.71 %	57.36 %	34.82 %	87.01 %	50.25 %
90.	Trinidad and Tobago	6.70 %	15.97 %	41.98 %	20.10 %	68.60 %	37.22 %
91.	Malaysia	6.69 %	15.59 %	42.88 %	20.12 %	69.45 %	39.06 %
92.	Namibia	6.63 %	11.76 %	56.41 %	48.32 %	75.21 %	45.69 %
93.	Mexico	6.53 %	14.75 %	44.27 %	24.52 %	70.13 %	38.17 %
94.	Romania	6.43 %	15.68 %	41.02 %	23.38 %	61.33 %	38.35 %
95.	China	6.36 %	12.89 %	49.30 %	31.44 %	73.62 %	42.85 %
96.	Gabon	6.30 %	11.82 %	53.34 %	34.11 %	83.20 %	42.70 %
97.	Bosnia and Herzegovina	6.25 %	13.89 %	45.00 %	19.66 %	73.14 %	42.19 %
98.	Syria	6.19 %	11.35 %	54.50 %	28.82 %	82.98 %	51.71 %
99.	Nepal	6.15 %	9.97 %	61.69 %	50.72 %	81.84 %	52.52 %
100.	Venezuela	6.11 %	13.42 %	45.57 %	23.82 %	74.43 %	38.46 %
101.	Cuba	5.99 %	15.17 %	39.49 %	17.98 %	69.73 %	30.76 %
102.	Belize	5.93 %	12.59 %	47.14 %	28.61 %	69.04 %	43.78 %
103.	Macedonia	5.86 %	14.28 %	41.03 %	19.28 %	64.74 %	39.05 %
104.	Lao PDR	5.80 %	9.70 %	59.78 %	47.38 %	84.77 %	47.20 %
105.	Iraq	5.77 %	9.18 %	62.87 %	39.33 %	89.09 %	60.20 %
106.	Tunisia	5.72 %	12.43 %	46.04 %	22.86 %	68.97 %	46.30 %
107.	South Africa	5.71 %	12.42 %	46.02 %	31.04 %	67.72 %	39.31 %
108.	Botswana	5.56 %	11.52 %	48.26 %	30.25 %	68.14 %	46.40 %
109.	Hungary	5.49 %	15.37 %	35.73 %	16.52 %	54.58 %	36.08 %
110.	Serbia	5.44 %	13.10 %	41.55 %	19.87 %	66.05 %	38.74 %
111.	Turkey	5.38 %	11.81 %	45.57 %	21.41 %	68.14 %	47.15 %
112.	Bolivia	5.16 %	9.34 %	55.23 %	43.45 %	80.64 %	41.61 %
113.	Jordan	5.13 %	11.50 %	44.61 %	24.18 %	67.33 %	42.33 %
114.	Iran	5.11 %	10.40 %	49.07 %	21.48 %	80.01 %	45.73 %
115.	Lebanon	5.01 %	11.12 %	45.03 %	21.05 %	70.28 %	43.75 %
116.	Moldova	4.78 %	10.24 %	46.74 %	25.61 %	71.32 %	43.29 %
117.	Italy	4.74 %	14.14 %	33.54 %	16.07 %	55.83 %	28.70 %
118.	Bahamas	4.52 %	11.08 %	40.81 %	15.89 %	65.39 %	41.15 %
119.	Australia	4.28 %	14.72 %	29.09 %	14.52 %	46.50 %	26.26 %
120.	New Zealand	4.28 %	15.73 %	27.19 %	16.15 %	40.54 %	24.89 %

Rank	Country	WorldRiskIndex	Exposure	Vulnerability	Susceptibility	Lack of coping capacities	Lack of adaptive capacities
121.	Brazil	4.26 %	9.70 %	43.87 %	26.08 %	67.81 %	37.73 %
122.	Ireland	4.15 %	14.09 %	29.46 %	14.67 %	40.81 %	32.90 %
123.	Czech Republic	4.15 %	11.00 %	37.75 %	14.37 %	66.67 %	32.22 %
124.	Republic of Korea	4.14 %	12.34 %	33.55 %	14.67 %	50.82 %	35.17 %
125.	Paraguay	4.12 %	7.68 %	53.63 %	34.37 %	81.99 %	44.51 %
126.	United Arab Emirates	4.09 %	10.48 %	38.99 %	10.85 %	58.78 %	47.35 %
127.	Bulgaria	4.08 %	11.08 %	36.78 %	17.30 %	57.92 %	35.12 %
128.	Kazakhstan	4.04 %	9.71 %	41.55 %	20.35 %	60.96 %	43.35 %
129.	Uruguay	3.94 %	10.84 %	36.35 %	21.19 %	50.74 %	37.13 %
130.	Argentina	3.77 %	9.71 %	38.80 %	23.22 %	60.34 %	32.85 %
131.	São Tomé and Príncipe	3.73 %	6.28 %	59.45 %	45.58 %	80.26 %	52.52 %
132.	Slovenia	3.72 %	11.75 %	31.65 %	14.18 %	49.12 %	31.65 %
133.	United States of America	3.72 %	12.00 %	30.98 %	16.80 %	48.65 %	27.49 %
134.	Croatia	3.71 %	11.17 %	33.22 %	16.63 %	50.69 %	32.35 %
135.	Kuwait	3.71 %	8.96 %	41.35 %	12.68 %	65.33 %	46.04 %
136.	Libya	3.67 %	7.53 %	48.74 %	24.12 %	73.53 %	48.57 %
137.	Portugal	3.62 %	11.02 %	32.85 %	17.34 %	49.78 %	31.43 %
138.	United Kingdom	3.61 %	11.61 %	31.11 %	15.51 %	47.55 %	30.25 %
139.	Russian Federation	3.56 %	9.07 %	39.27 %	19.88 %	59.48 %	38.45 %
140.	Belgium	3.51 %	11.82 %	29.66 %	15.03 %	42.05 %	31.92 %
141.	Cyprus	3.46 %	10.62 %	32.63 %	15.10 %	50.09 %	32.69 %
142.	Mongolia	3.43 %	6.99 %	49.13 %	35.15 %	67.53 %	44.70 %
143.	Poland	3.42 %	9.60 %	35.62 %	17.27 %	56.89 %	32.72 %
144.	Austria	3.41 %	13.40 %	25.48 %	13.85 %	37.52 %	25.06 %
145.	Slovak Republic	3.38 %	10.18 %	33.22 %	14.43 %	54.80 %	30.43 %
146.	Spain	3.29 %	10.65 %	30.87 %	15.06 %	49.65 %	27.91 %
147.	Latvia	3.09 %	8.66 %	35.63 %	21.39 %	55.32 %	30.17 %
148.	Ukraine	3.02 %	7.20 %	41.91 %	21.49 %	62.05 %	42.20 %
149.	Belarus	2.98 %	8.03 %	37.15 %	17.19 %	58.07 %	36.19 %
150.	Germany	2.96 %	11.14 %	26.55 %	14.78 %	39.20 %	25.67 %
151.	Lithuania	2.89 %	8.39 %	34.43 %	19.58 %	49.53 %	34.19 %
152.	Denmark	2.86 %	10.53 %	27.16 %	14.56 %	39.82 %	27.11 %
153.	Singapore	2.85 %	9.21 %	30.97 %	14.60 %	47.37 %	30.94 %
154.	Oman	2.80 %	6.41 %	43.60 %	21.08 %	60.82 %	48.91 %
155.	France	2.76 %	9.64 %	28.60 %	15.45 %	42.23 %	28.11 %
156.	Luxembourg	2.70 %	10.09 %	26.78 %	11.92 %	39.99 %	28.43 %
157.	Seychelles	2.68 %	6.09 %	43.97 %	21.16 %	71.65 %	39.10 %
158.	Israel	2.60 %	7.13 %	36.44 %	18.40 %	56.20 %	34.73 %
159.	Canada	2.57 %	9.08 %	28.32 %	14.04 %	44.58 %	26.35 %
160.	Switzerland	2.55 %	9.96 %	25.57 %	14.27 %	36.89 %	25.56 %
161.	Barbados	2.44 %	6.87 %	35.54 %	15.76 %	50.34 %	40.52 %
162.	Egypt	2.38 %	4.79 %	49.62 %	23.20 %	76.62 %	49.04 %
163.	Grenada	2.29 %	4.90 %	46.71 %	26.14 %	68.70 %	45.29 %
164.	Norway	2.28 %	8.75 %	26.09 %	13.98 %	38.52 %	25.77 %
165.	Estonia	2.25 %	6.80 %	33.15 %	17.90 %	51.09 %	30.47 %
166.	Finland	2.06 %	8.14 %	25.27 %	14.67 %	36.55 %	24.59 %
167.	Sweden	2.00 %	8.14 %	24.57 %	14.34 %	35.46 %	23.91 %
168.	Kiribati	1.88 %	3.31 %	56.87 %	41.52 %	83.54 %	45.56 %
169.	Bahrain	1.66 %	4.03 %	41.27 %	15.74 %	61.07 %	47.01 %
170.	Iceland	1.56 %	6.22 %	25.01 %	14.06 %	37.04 %	23.94 %
171.	Saudi Arabia	1.26 %	2.91 %	43.30 %	18.26 %	67.84 %	43.80 %
172.	Malta	0.72 %	2.15 %	33.34 %	15.21 %	50.13 %	34.67 %
173.	Qatar	0.02 %	0.05 %	33.18 %	9.40 %	52.12 %	38.03 %

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Page 4: A woman and her child in Haiti after the earthquake in 2010. Photo: Welthungerhilfe.
Page 12: Flood victims in Pakistan in August 2010. Photo: Bottelli/ Welthungerhilfe.
Page 42: A mother and her child in the Dissin Department in south-western Burkina Faso. Photo: Bretz/Welthungerhilfe.
Page 51: Map of a Community-Based Disaster Risk Management (CBDRM) project of Welthungerhilfe in the Sundarbarns in India. Photo: Welthungerhilfe.
Page 58: A woman in the Indian Sundarbarns planting trees on a new dike to protect it against flooding. Photo: Boethling/ Welthungerhilfe.

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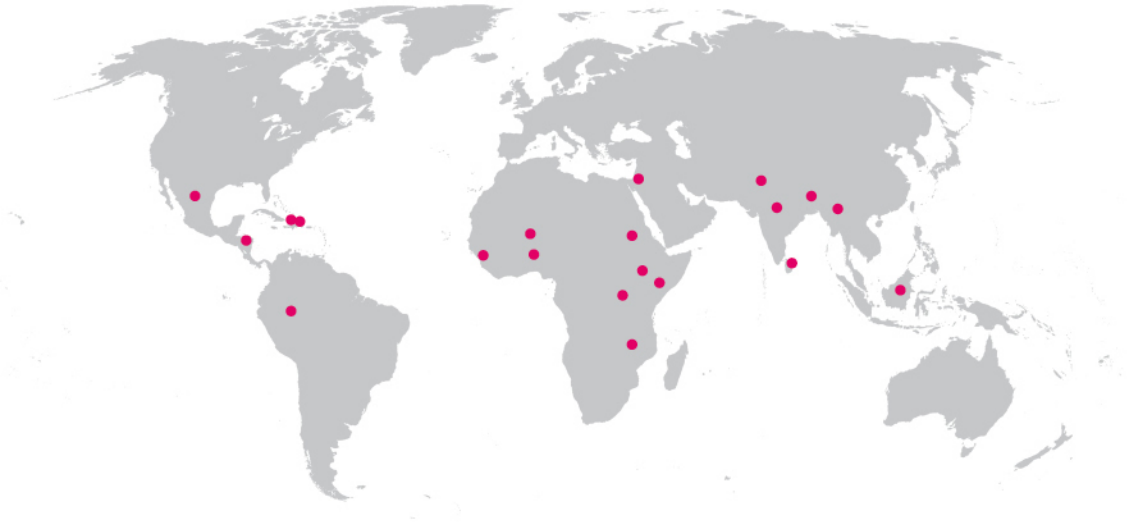

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