South Eastern Europe

Disaster Risk Mitigation and Adaptation Programme

THE WORLD BANK

ISDR
International Strategy for Disaster Reduction

South Eastern Europe
Disaster Risk Mitigation and Adaptation Programme

The World Bank, Sustainable Development Department Europe and Central Asia Region
and UN/ISDR secretariat Europe

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Abbreviations and Acronyms

CMEPC	Civil-Military Emergency Preparedness Council
DPPI SEE	Disaster Preparedness and Prevention Initiative for South Eastern Europe
ECMWF	European Centre for Medium-range Weather Forecasting
EU	European Union
ICEED	Informal Conference of South Eastern Europe Directors
MIC	Monitoring and Information Center
SEE	South Eastern Europe
SEEDRMAP	South Eastern Europe Disaster Risk Mitigation and Adaptation Programme
UN/ISDR	United Nations, secretariat for the International Strategy for Disaster Reduction
WB	World Bank
WMO	World Meteorological Organization

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Executive Summary

Vulnerability of South Eastern Europe to disasters and climate change

Countries in Central and South Eastern Europe are exposed to a range of disasters caused by the impact of natural hazards, including earthquakes, floods, forest fires, drought and landslides. The impact of climate change, accompanied by changes in land-use patterns and increased human settlements in areas that are prone to disasters, will certainly increase risk from such weather-related hazards in the coming years. According to projections[1], the following should be expected due to climatic changes: (i) increases in weather variability; (ii) new extreme values of temperatures, precipitation or wind speed; (iii) new exposures; and (iv) more frequent and fierce disasters.

As the effects of climate change continue to manifest, they will combine with changes in land-use patterns to further increase the social and economic vulnerabilities of the countries of South Eastern Europe (SEE) to disaster events. The region has been affected by frequent floods in the last few years, and severe droughts and forest fires in 2007. In addition to weather-related vulnerability, the Mediterranean/Transasian geologic fault zone passes through the Balkans, while the Vrancea zone intersects Romania and parts of Bulgaria and Moldova, making these areas vulnerable to earthquakes and other geological hazards. A 1963 earthquake destroyed a large part of Skopje, in the Former Yugoslav Republic of Macedonia, and killed about 1,300 people; another earthquake (measuring 7.2 on the Richter scale) struck Bucharest in 1977, killing about 1,570 people and causing economic losses well in excess of USD 2 billion. The capacity to manage seismic risk in the SEE region has been low, as compared with the best world practices and technical possibilities.

Disasters already have a significant impact on economic performance in the SEE region and may affect country macroeconomic standing. The most important macroeconomic effects are those that affect gross domestic product, sectoral production, the current account balance[2], indebtedness and public finances. The growing frequency and severity of weather-related events is likely to increase the financial vulnerability of many households in the SEE countries. In the future, households are likely to experience more frequent and potentially severe damages to residential properties, as well as loss of employment income due to business interruption. In view of the expected consequences of climate change, combined with the level of exposure to geological hazards, disaster risk management becomes a vital and urgent aspect of SEE country development strategies.

Worldwide experience

In the past, disasters were considered natural events, against which response was the only action that could be undertaken. Therefore, most countries and organizations, including the World Bank group, focused their efforts on emergency response and recovery. However, over the last few decades, due to the increased impact of devastating disasters and a better understanding of underlying causes and effects, the focus has slowly shifted from disaster response to disaster risk reduction and climate change adaptation. This broader approach aims at reducing the vulnerability of countries and communities to the impact of natural hazards and promoting adaptation to changes in climatic patterns.

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1 Vulnerability and Adaptation to Climate Change; European Environment Agency; 2005.

2 The current account balance is one of the major metrics used to measure the nature of a country's foreign trade. It can be defined as the sum of the balance of trade (exports minus imports of goods and services), taking out factor incomes (such as interest and dividends) and transfer payments (such as foreign aid).

The commitment of the international community to a disaster risk management agenda, as part of sustainable development, is well exemplified by the World Conference on Disaster Reduction held in Kobe, Japan, in January 2005, where 168 governments adopted a 10-year plan to make the world safer from the impact of natural hazards. This plan, called the "Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters", is a global blueprint for disaster risk reduction efforts over the next decade. Its goal is to reduce disaster losses to the human, social, economic and environmental assets of communities and countries by the year 2015. The Hyogo Framework for Action sets a clear expected outcome - the substantial reduction of disaster losses, in lives as well as the social, economic and environmental assets of communities and countries - and lays out a detailed set of priorities to achieve this. The Hyogo Framework for Action emphasizes that disaster risk reduction is a central issue for development policies, in addition to being of interest to various science, humanitarian and environmental fields. It evolves around the following considerations in approaching disaster risk reduction activities: "multi hazard" approach; people-centered; gender perspective and "capacity building" and technological transfer. To help attain the expected outcome, the Hyogo Framework for Action identifies five Priorities for Action: 1. Making disaster risk reduction a priority; 2. Improving risk information and early warning; 3. Building a culture of safety and resilience; 4. Reducing the risks in key sectors; 5. Strengthen preparedness for response.

Many countries around the world are taking a proactive approach to disaster risk reduction. Indonesia, India, South Africa, Algeria, the Caribbean, the United Kingdom of Great Britain and Northern Ireland (United Kingdom), France, Germany, Japan, Sweden, Australia, the United States of America (United States), and New Zealand are some of the countries providing good examples of disaster risk reduction activities.

Turkey initiated a large programme, in partnership with the World Bank, in disaster risk reduction after the 1999 Marmara earthquake. Romania is currently implementing a similar programme through support from the World Bank in disaster risk mitigation and preparedness. Nevertheless, the magnitude of severe disasters may sometimes overwhelm even the most prepared countries (examples include the 1995 Kobe earthquake and the 2005 Hurricane Katrina in the United States).

World Bank assistance

Since 1984, the World Bank has financed over 500 projects that address disasters caused by the impact of natural hazards. It is currently engaged with many countries in disaster risk reduction, including Turkey, Poland, Romania, Mexico and Columbia. The financed projects incorporate activities that address the countries' specific vulnerabilities. They support emergency management programmes through rehabilitation of damaged infrastructure and support to economic recovery, as well as through strengthening emergency management institutions to better respond to a wide spectrum of emergencies. World Bank operations also support a variety of interventions, including disaster insurance schemes, in order to reduce multiple disaster risks, save lives and reduce the economic, social and financial impacts of disasters.

The following are some examples of World Bank-financed projects in the Europe and Central Asia region.

In Turkey, the Bank has supported a number of disaster recovery and hazard mitigation projects aiming at the reconstruction of physical infrastructure and at institutional development to enhance preparedness for future disasters. The projects have financed disaster mitigation investments such as flood protection infrastructure, flood forecasting and monitoring, earthquake risk mitigation investments, seismic retrofitting, hazard mapping, enhancement of legal frameworks, disaster insurance programmes, enhancement of emergency preparedness, response equipment, communication and emergency management information systems, and training.

The ongoing project in Romania on disaster risk mitigation and emergency preparedness is a multi-hazard operation. It assists the Romanian Government in reducing the country's vulnerability to disasters caused by the impact of natural hazards and by accidental mining spills through strengthening institutional and technical capacity for emergency management and response, implementing specific risk-reduction investments for floods, earthquakes and landslides, improving the safety of water-retention and tailing dams and waste dump facilities, as well as through development of a disaster insurance programme.

In Poland, the World Bank's flood-related projects have supported the restoration of basic infrastructure in urban and rural areas affected by floods and repairs to the flood management system. They have helped make improvements to the policy framework and institutional capacity for flood management, including urgent investments to upgrade hydrotechnical infrastructure, modernize flood management systems and meteorological systems, update mapping and modelling of river basin areas using geographic information systems, improve forecasting and planning, and to build flood protection infrastructure.

These examples show the most recent efforts at an individual country level. However, given the sheer magnitude of potential losses, the adverse social and economic consequences of large disasters caused by the impact of natural hazards can easily overwhelm the coping capacity of a single country and hence are very likely to transcend the borders of affected countries. Many of the hazards in the SEE region are shared, due to the fact that a number of countries are located on the same seismic fault and that 90 per cent of the SEE area falls within transboundary river basins. However, today the regional cooperation in the area of disaster risk management, particularly risk financing, remains rather weak. Providing a pragmatic disaster risk management framework that would seamlessly combine risk reduction with disaster risk transfer to the global reinsurance and capital markets is imperative, in order to ensure adequate capacity to respond to geological hazards and the growing risk of climate change, as well as to the increasing concentration of economic activities in disaster-prone areas.

Proposed support to SEE countries

The presented report and proposed Disaster Risk Mitigation and Adaptation Programme for SEE countries (SEEDRMAP) have been developed by the World Bank, together with the United Nations, secretariat for the International Strategy for Disaster Reduction (UN/ISDR secretariat). The report and Programme have been supported by the Global Facility for Disaster Risk Reduction and Recovery, which was set up with multiple donors and partners, notably the UN/ISDR secretariat, to reduce vulnerability to disasters in support of the Hyogo Framework for Action.

The initiative has been carried out in close cooperation with the European Commission, the Council of Europe, the Disaster Preparedness and Prevention Initiative for South Eastern Europe, the Civil-Military Emergency Preparedness Council, the Council of Europe (EUR-OPA), the Council of Europe Development Bank, the Organization for Economic Cooperation and Development, the World Meteorological Organization, the Informal Conference of South Eastern Europe Directors, and several other partners, including the United Nations Office for the Coordination of Humanitarian Affairs and the United Nations Children's Fund.

As proposed, SEEDRMAP builds on World Bank experience, as well as the experience of many countries in disaster risk reduction. The objective of the Programme is to reduce the vulnerability of SEE countries to natural hazards and to reduce human, economic and financial losses due to weather extremes and other disasters caused by the impact of natural and technological hazards. SEEDRMAP provides a menu of options for SEE countries to reduce the risk of disasters and to strengthen preparedness and capacity response.

Disaster risk mitigation. The Programme would extend support to the protection of vital infrastructure, helping it to withstand key disaster risks, and taking into account the increased vulnerability resulting from climate change. Disaster risk mitigation could include flood control and dam safety, as well as retrofitting of buildings, bridges, lifelines and other key infrastructure to better resist seismic shocks and extreme weather events.

Disaster risk insurance and hedging instruments. The Programme would support the SEE countries in developing disaster risk financing and weather risk hedging instruments to reduce the financial vulnerability of governments, businesses, and households to the adverse impacts of geological hazards and climate change through development of market-based risk transfer mechanisms. The World Bank is also working on the issuance of Global Catastrophe Mutual Bonds, as a multi-country/multi-disaster facility that would provide parametric insurance to governments willing to participate in the project.

Adaptation. Adaptation becomes essential to ensure that development activities are resilient to the changes in weather conditions in the region. Adaptation measures include revisions of building codes and land-use plans, changes in agriculture practices and water resources management.

Disaster preparedness. The Programme would extend funding to develop local capacity for disaster response, as well as to strengthen regional cooperation on preparedness, including in weather forecasting, flood early warning, forest fire fighting, civil protection, and emergency management information and communications systems.

The proposed Programme would provide financing to investment priorities in disaster risk reduction and adaptation at the regional and country levels. To address the uniqueness of country vulnerabilities and response mechanisms, the Programme would have the built-in flexibility to accommodate requests for different types of lending projects that could best meet the climate adaptation and disaster risk management needs of each country. With the rather broad range of activities that would be eligible for World Bank financing under this framework, and to ensure its effectiveness, the Programme would be deployed in two phases.

The first phase would provide financing to soft (non-structural) and less expensive measures that would have significant positive impacts. These include activities and investments that can build the capacity of the SEE Governments to reduce the risk of and respond efficiently to disasters, such as weather forecasting and early warning systems, equipment and systems to strengthen government response capacity to disasters, development of disaster insurance schemes, land-use planning and building code enforcement, and development of disaster risk reduction and adaptation strategies.

The second phase would extend financing to structural investments that would reduce the vulnerability of the population to disasters. The investments in this phase could include mitigation measures such as flood control, retrofitting of buildings and infrastructure, and relocating communities who live in flood plains. This phase would also extend funding to adaptation measures, such as power grid enhancement and coastal zone management. Since the second-phase investments would be rather significant, the development and approval of a country-level comprehensive disaster risk reduction and adaptation strategy, identifying priority actions, would be a trigger for advancement to the second phase of the Programme.

Both phases would include contingency funding to provide readily available liquidity in the aftermath of a disaster, and to back up the disaster insurance programme.

Regional cooperation

Successful implementation of several activities, such as weather forecasting and flood early warning systems, will depend on the agreement among the Member States to share information using standard formats. Since large-scale disasters often overwhelm the most prepared countries (e.g., Hurricane Katrina in the United States), it is important that the SEE region strengthens its existing agreements, builds the necessary command and control infrastructure, and establishes specialized disaster response teams that can be mobilized quickly across borders in case of a large-scale disaster. Successful implementation of regional cooperation will depend entirely on building both local capacity to respond to local disasters, and the capacity to support other countries in case of a large disaster. Therefore, relevant components of the Programme will be designed at the regional level, but implementation will be executed in the individual countries.

Implementation arrangements

It is suggested that the Disaster Preparedness and Prevention Initiative, the newly established Regional Cooperation Council and its secretariat play an important role in the various activities that will be implemented and coordinated at the regional level. As for the activities to be implemented at the national level, each Government will decide on the most appropriate implementation arrangements, while the establishment of a National Platform for Disaster Risk Reduction is recommended to ensure national coordination. The responsibilities will be further detailed and clarified as part of the preparation of the Programme.

As noted above, the list of activities to be supported represents a menu of options from which countries could choose, depending on the specific areas where improvements are necessary. Each country-specific project would be tailored to reflect country needs. Prioritization and sequencing of investments constitute an important task that could be accomplished in the course of Programme preparation. Potential World Bank financing could complement financing by the SEE Governments and other potential funding from the European Commission and other donors.

Photo by Nicoleta Trifan (Romania)

1

Vulnerability of South Eastern Europe to Disasters and Climate Change

Key development issues

Over the last few decades, the frequency of major disasters caused by the impact of natural hazards, as well as losses caused by them, has increased significantly. Worldwide, the number of disasters grew from 100 in 1975 to about 400 in 2006[3]. The economic costs of major disasters in constant dollars are estimated to be 15 times higher than they were in the 1950s: USD 652 billion in material losses were recorded in the 1990s[4].

As the effects of climate change become increasingly visible, the social and economic vulnerabilities to disaster events are rising, along with a growing world population, the consequent pressure on land, and settlements in disaster-prone areas. The current and projected effects of climate change, combined with changes in land-use patterns, will likely further increase the frequency and severity of disasters caused by the impact of natural hazards such as floods, droughts, hurricanes, tornadoes, forest fires and landslides. A further contributing factor is environmental degradation. In a drought, for example, problems with shortages of water are exacerbated by deforestation, soil erosion and inappropriate land use. Destruction of forests and overgrazing leads to desertification. Poor agricultural practices, which destroy groundcover and other natural means of environmental defence, lead to floods by silting up rivers and contributing to the loss of absorptive capacity in the soil. Reasons behind the more severe destruction commonly caused in developing countries by natural hazards, often of weather-related origin, are poor construction standards, inadequate land-use planning, lack of building code enforcement, and informal housing in vulnerable areas.

In the past, disasters were considered natural events against which response was the only action that could be undertaken. Therefore, most countries and organizations, including the World Bank group, focused their efforts on emergency response. However, over the last few decades, due to the increased impact of devastating disasters and better understanding of underlying causes and effects, the focus has slowly shifted from disaster response to disaster risk reduction and climate change adaptation. This broader approach aims at reducing the vulnerability of countries and communities to the impact of natural hazards, and promoting adaptation to changes in climatic patterns.

Effects of climate change

Changes in climate and related impacts are already observed globally and are expected to become more pronounced. The report released by the Intergovernmental Panel on Climate Change in 2007[5] shows that climate change will lead to the exacerbation of natural hazards. The key implications of climate change are an increasing magnitude and frequency of climatic extremes, that in turn will lead to a higher probability of natural hazards associated with hydrometeorological conditions such as floods, landslides, avalanches, drought, heatwaves and soil erosion, with their associated damages.

The effect of climate change is a very important development issue for Europe, as the majority of human losses in the region derive from the impacts of hydrometeorological events, as measured by the number of people reported killed in disasters per million inhabitants; 4.77 people were killed in disasters caused by the impact of hydrometeorological hazards, as compared with 0.23 killed in geologically-based events, in the period 1991 to 2005[6]. Mountain regions, coastal zones, wetlands and the Mediterranean region are particularly vulnerable. The adverse impacts of climate change and disasters caused by the impact of natural hazards are projected to affect various socio-economic sectors, such as human health, agriculture, fisheries, forestry, water resources, tourism and energy. The most vulnerable industries, settlements and societies are those located in coastal and flood plains and those in areas prone to extreme weather events, especially the areas experiencing rapid urbanization. Where extreme weather events become more intense and more frequent, the economic and social costs will increase.

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3 Source: Emergency Events Data Base (EM-DAT), a global disaster database maintained by the Centre for Research on the Epidemiology of Disasters (CRED) in Brussels.

4 Source: IMF 2003 as cited in Hazards of Nature, Risk to Development - An IEG Evaluation of World Bank Assistance to Natural Disasters; World Bank 2006.

5 Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change; IPCC; 2007.

6 Emergency Events Data Base (EM-DAT); Centre for Research on the Epidemiology of Disasters.

Recent studies indicate that, over much of Europe, one-in-100-years floods will occur every couple of decades[7]. The studies on flood risk and climate change at the European Commission Joint Research Centre estimate that the potential damage of a 100-year flood will rise in Europe between 19 and 40 per cent, and the number of people affected is estimated to grow by 6 to 11 per cent.

The projections suggest[8] that the South Eastern European, Mediterranean and Central European regions are the most vulnerable to climate change, and considerable adverse impacts are expected to occur to natural and human systems that are already under pressure from changes in land-use and settlement patterns. The expected rise in temperature will have impact on snow cover, glaciers and permafrost, causing an increased risk of disasters. Mountainous regions are particularly vulnerable to climate change, along with coastal zones, due to sea level rise and changes in frequency and/or intensity of storms. Coastal areas along the Mediterranean and Black Seas in particular are at high risk. Southern Europe is consistently projected to become much drier and warmer, with a higher risk of drought and negative consequences for agriculture and water supply. Heatwaves, combined with drought, will trigger massive forest fires. The changes in precipitation, temperature and sea levels will have significant financial and human consequences throughout Europe.

In summary, due to climatic changes, the following should be expected:

- Increases in weather variability.
- New extreme values of temperatures, precipitation and wind speed.
- New exposures.
- More frequent and severe disasters.

Consequently, based on current knowledge, disaster risk management becomes a vital and urgent component of adaptation to and a means to cope with climatic changes.

Table 1. Disaster matrix by country

Country	Disasters								
	Earthquake	Flood	Landslides	Drought	Extreme temperature	Wind storm	Wild fire	Epidemic	Technological
Albania	x	x	x	x	x	x	x	x	x
Bosnia and Herzegovina		x	x	x		x	x	x	x
Bulgaria	x	x		x	x	x	x		x
Croatia	x	x		x	x	x	x		x
FYR of Macedonia	x	x		x	x	x	x	x	x
Moldova	x	x	x	x	x	x		x	
Romania	x	x	x	x	x	x		x	x
Serbia	x	x			x	x	x	x	x
Montenegro	x	x			x	x	x	x	x
Slovenia	x	x			x				x
Turkey	x	x	x		x	x	x	x	x

Source: EM-DAT, as summarized in UN/ISDR-WB 2008.

[7] Climatic Change; Lehrer et al, 2006.
[8] Vulnerability and Adaptation to Climate Change; European Environment Agency; 2005.

Table 2. Average annual incidence of major disasters and vulnerability of SEE countries

Country	Annual average incidence of major disasters					Annual average number of deaths due all disasters	Exposed population		
	Drought	Earthquake	Flood related	Wind storm	Technology related		Drought	Earthquake	Floods
Albania	0.12	0.09	0.24	0.06	0.06	7.82	NA	155,688	131,704
Bosnia and Herzegovina	0.17	x	0.28	0.11	0.17	3.72	71,397	NA	NA
Bulgaria	0.21	0.15	0.27	0.15	0.15	6.64	325,406	NA	275,537
Croatia	0.28	0.06	0.22	0.06	0.17	8.61	NA	30,928	108,929
FYR of Macedonia	0.17	x	0.22	x	0.11	13.39	NA	NA	17,784
Moldova	0.09	0.09	0.22	0.09	x	1.83	279,603	18,909	193,262
Romania	0.45	0.12	1.03	0.24	0.48	82.42	347,229	1,007,506	1,174,894
Serbia and Montenegro*	0.17	0.06	0.50	0.06	0.56	10.00	NA	NA	321,934
Slovenia	0.04	0.09	0.04	x	x	0.04	NA	30,984	NA
Turkey	0.30	0.97	1.06	0.21	3.00	941.36	NA	2,745,757	1,883,782

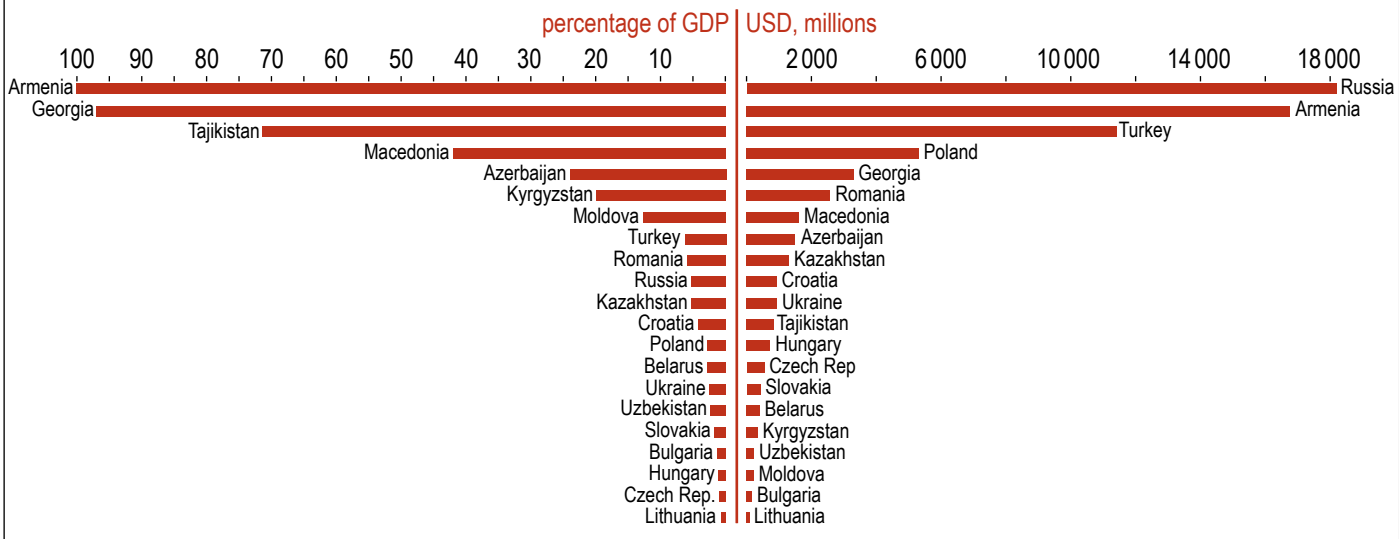
x - data not available for computation, NA - data not available in the website

* As Serbia and Montenegro became independent States in 2006, there is lack of retrospective, country-specific, secondary risk-related data available in the EM-DAT database. So EM-DAT's combined data for Serbia and Montenegro is presented in this table.

Source: Annual average incidence and death computed using EM-DAT, exposed population UNDP GRID website, http://gridca/grid/unep.ch/undp

Figure 1

Economic Loss Potential*



Disaster events (annual probability of occurrence of 0.5 percent)

* Note: Armenia's all hazards damage is 708.5% of GDP
The figure does not include drought, forest fire and industrial accident hazards.
Source: Pusch 2004

Table 3. Major recent droughts in SEE countries

Country	Date	Number of deaths	Number of victims (people)	Economic loss (in millions of USD)
Albania	1989-1991	0	3.2 million	24.67
Bosnia and Herzegovina	2003	0	62,575	250
Bosnia and Herzegovina	2000	0	0	158
Croatia	2003	na	na	330
Moldova	2000	na	2.6	170
FYR of Macedonia	1993	0	0	10
Romania	2000	na	na	500

Source: UN/ISDR - WB 2008[9].

Vulnerability of SEE countries to disasters

The SEE region is exposed to a variety of natural hazards, including floods, droughts, forest fires, earthquakes and landslides.

A recent disaster risk assessment carried out for 11 SEE countries[10] examined the occurrence of different disasters in each country. Table 1 above gives an overview of the results. The country-wise disaster matrix shows that impacts from flood and technological hazards are common causes of disasters in all countries of the region.

The same study analysed the vulnerability of SEE countries based on the incidence rate of disasters, the annual average number of deaths and the exposed population. Table 2 shows that, on average, one flood strikes Romania and Turkey every year and the combined data on Serbia and Montenegro shows one flood event every two years. A substantial population is exposed to earthquakes in Albania, Croatia, the Former Yugoslav Republic of Macedonia, Romania, Slovenia and Turkey, while in most countries a large number of people are at risk of floods. Data on population exposed to drought is available for a few countries like Bosnia and Herzegovina, Bulgaria, Moldova and Romania, and shows the risk is high.

Disasters have a significant impact on countries' economic performance and may affect their macroeconomic situations. The most important macroeconomic effects are those that affect gross domestic product, sectoral production, the current account balance, indebtedness and public finances. The economic loss potential for European and Central Asian countries is shown in figure 1.

While the above figure 1 does not include the potential losses due to droughts, drought-related hazards are also severe in many SEE countries. Drought events have been most frequent in Bosnia and Herzegovina. Considerable economic losses due to drought have been recorded in Albania, Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic of Macedonia, Moldova and Romania. The extent of economic damages from drought in SEE countries is summarized in table 3.

With expected temperature rises of 4-5°C throughout Southern and South Eastern Europe, the yearly rainfall is expected to drop by up to 40 per cent of current annual precipitation[11], and both the frequency of droughts and the economic damages caused by them could become even more pronounced.

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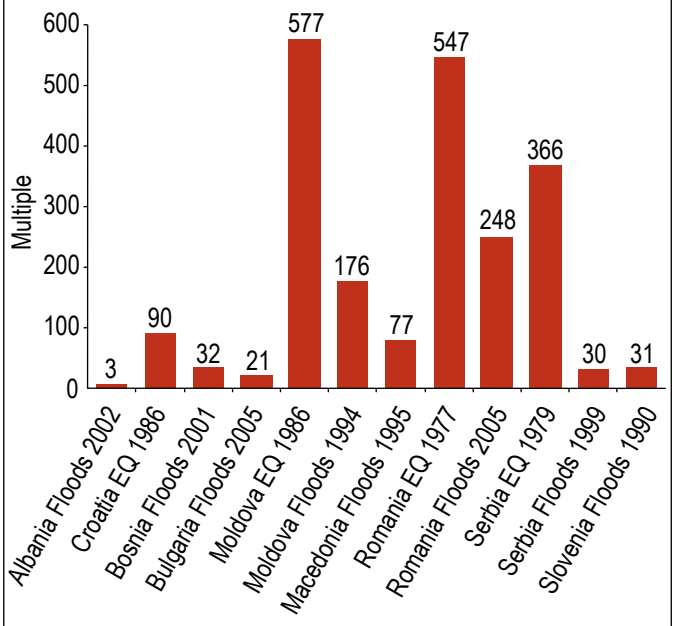
9 South Eastern Europe Disaster Risk Mitigation and Adaptation Initiative: Risk Assessment in South Eastern Europe - A Desk Study Review; UN/ISDR-WB; 2008.

10 South Eastern Europe Disaster Risk Mitigation and Adaptation Initiative: Risk Assessment in South Eastern Europe - A Desk Study Review; UN/ISDR-WB; 2008.

11 Green Paper from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: Adapting to Climate Change in Europe - Options for EU Action; European Commission; 29 June 2007.

Figure 2

Economic Loss from Disaster Event/Total Emergency Funds



Source: Gurenko et al. 2008; based on data from AIR, 2007 EQECAT, 2007 and Munich Re, 2007.

Economic and financial impacts of disasters on SEE countries

The increased intensity and severity of natural hazards will have a significant impact on the SEE countries' fiscal stability, households and businesses. The following paragraphs summarize these effects.

Adverse impacts on countries' fiscal stability and macroeconomic performance. With the growing frequency and severity of natural hazards whose impact can cause disasters, it is becoming increasingly difficult to cover economic costs of disaster events from recurring budgets. Even though every SEE country makes annual budget appropriations for emergency expenditures, often the actual budgetary outlays on such events are well in excess of budgeted amounts. To finance losses from large disasters caused by the impact of natural hazards, countries typically make additional emergency budgetary appropriations, funded either by budgetary reallocations or by increasing budget deficits through borrowing. To indicate the magnitude of the problem, figure 2 presents a ratio of economic losses from the recent large disaster events in SEE countries to the amount of annual budgetary appropriations for emergencies in 2007. As can be seen, the mismatch between planned annual budgetary appropriations and the size of actual economic losses caused by large disaster events is rather striking. For instance, in the case of the 2005 floods in Bulgaria, it would have taken 21 annual planned emergency budgetary allocations to cover the economic losses from the flood.

Besides adversely affecting the fiscal stability of small and mid-size economies, large disasters caused by the impact of natural hazards may also have profound implications for the SEE countries' macroeconomic performance and their overall global economic competitiveness[12] .

Socio-economic implications for households. The growing frequency and severity of weather-related events is likely to increase the financial vulnerability of many households in the SEE countries. In the future, households are likely to experience more frequent and potentially severe damages to residential properties, as well as greater loss of employment income due to business interruption. Given the current very low level of disaster insurance penetration in SEE countries, of the order of 1-3 per cent, climate change is likely to take a considerable financial toll on the population of the region.

Adverse economic effects on business. Marked increases in losses from property damage and lost revenue due to business interruption caused by disasters translate into an increased volatility of earnings in the sectors exposed to weather. These include utilities, tourism, agriculture, transportation, aviation and forestry. In turn, the increased volatility of earnings means a higher cost of capital for businesses operating in the region.

[11] In a major regional study on the economic vulnerability of Latin American countries to disasters caused by the impact of natural hazards, Friedman (2003), for instance, finds that besides the direct costs associated with physical damage, disasters typically lead to (i) a worsening of the fiscal position as governments pay for reconstruction and sources of revenue are disrupted; (ii) a worsening of the trade balance as the exporting capacity is hampered and imports for reconstruction surge;(iii) downward pressure on the exchange rate due to the worsening of the trade balance and concerns about the repayment capacity of the government by international investors; and (iv) inflationary pressures. Therefore, the total impact on the budget widely exceeds the direct costs of relief and reconstruction from disasters.

Photo by Camil Tulcan

2

Disaster Risk Financing

Given the sheer magnitude of potential losses, the adverse social and economic consequences of large disasters caused by the impact of natural hazards can easily overwhelm the coping capacity of a single country, and hence are very likely to transcend the borders of affected countries. However, today the SEE regional cooperation in the area of disaster risk reduction, particularly risk financing, remains rather weak. Providing a pragmatic disaster risk management framework that would seamlessly combine risk reduction, including mitigation, with disaster risk transfer to the global reinsurance and capital markets is imperative, in order to insure adequate capacity to respond to geological hazards, the growing risk of climate change and the increasing concentration of economic activities in disaster-prone areas.

Inter-regional disaster risk financing mechanisms

To date, the European Union Solidarity Fund has been the main financial vehicle used by European Union (EU) Member States for the purposes of obtaining disaster-related financial support in the aftermath of disaster events. Established in 2002, following major floods in Europe, the Fund partially compensates central government budgets for damage suffered as a result of disasters caused by the impact of natural hazards. It does not provide compensation for private losses.

The Fund responds to requests for financial assistance following disasters caused by the impact of natural hazards from the EU Member countries or countries which have opened EU accession negotiations. It may grant financial assistance to eligible States totaling up to €1 billion per year, although in practice the largest amount the Fund can pay at once without breaching its annual budget is €750 million, as the Fund must keep at least one-quarter of its budget available till the end of the third quarter. The Fund can also borrow up to €2 billion from future-year budgets. In case of truly large-scale emergencies, Member States may agree to allocate additional amounts to the budget, if needed.

To be eligible for assistance from the Fund, damages caused by natural hazards and the intervention costs to which these give rise to must be in excess of an absolute or a relative threshold, whichever is lower. These thresholds are €3 billion or 0.6 per cent of gross national income of the affected country, respectively.

Nevertheless, in exceptional circumstances, the Fund can grant assistance to countries in cases of smaller regional disasters that fall below the above-mentioned thresholds. Decisions on providing assistance in these cases involve extensive political consultations.

The Fund does not have a pre-funded annual budget. To mobilize financing for disaster aid, the Fund needs a valid country application, which triggers an extensive budgetary procedure necessary for amending the annual EU budget in each case.

Despite the existence of the Fund, there appears to be a genuine lack of an integrated approach to disaster risk management at the EU level that would encompass elements of risk reduction and risk financing. In the absence of such an integrated disaster risk management strategy, the European Commission will find it difficult to provide incentives for EU Member States to reduce their vulnerability to disasters caused by the impact of natural and technological hazards over time.

Operating as a pay-as-you-go mechanism, the Fund suffers from the following major drawbacks:

(i) The Fund's financial capacity is not sufficient to deal with large disaster events, and would have to be supplemented with additional allocations of financial resources from individual EU Members in case of a major disaster caused by the impact of natural hazards.

(ii) The current Fund design disproportionately benefits countries with large risk exposures relative to the size of their economies (such as SEE countries), due to a major cross-subsidy they receive from larger countries with relatively low disaster risk exposures (such as Germany and France) in the case of a major disaster.

(iii) The Fund's approach to funding is inappropriate for its purpose. Despite a rather unpredictable and highly volatile pattern of its future outlays, the Fund relies on fixed annual budget allocations, which in case of large disasters is likely to result in a major mismatch between the financial resources available to the Fund annually and the potential expenditures it may incur.

(iv) The Fund does not employ any market-based risk transfer mechanisms, such as insurance/reinsurance, to supplement the existing budgetary commitments from EU Members.

(v) Financial compensation provided by the Fund in the aftermath of disasters caused by the impact of natural hazards is not linked to any risk reduction requirements for disaster-affected countries.

Fiscal disaster risk financing mechanisms at the country level

In all surveyed SEE countries, national annual budgetary allocations for emergencies by and large account for the largest share of fiscal resources available to deal with consequences of natural hazards. In addition, countries often have some additional off-budgetary resources, which can be released in the case of a disaster. In an emergency, most countries can increase their budgetary allocations by passing special emergency legislation. Most of national emergency funds are non-accruing funds, meaning that they maintain the same statutory size, and that in years when there are no losses, they receive no additional financial allocations from national budgets.

National disaster funds are typically very small compared to the potential economic and fiscal damages that may be caused by large disaster events in these countries. Moreover, if more severe disaster events with longer return periods are taken as a benchmark for the national disaster risk funding capacity, the countries' financial preparedness for such events is suspect. For instance, the Republican disaster fund in Bulgaria (USD 31 million) - the second largest of all in SEE countries (after Slovenia) - can cover only 0.6 per cent of damages from an earthquake with a return period of 250 years, whereas the Albanian Reserve Fund of USD 17 million would be enough to cover only 0.3 per cent of damages from an earthquake with a similar return period.

In most SEE countries, the emergency assistance aid can be made available to households, businesses and local governments. None of the surveyed SEE countries, however, has a means-testing requirement as a precondition for emergency assistance. Overall, there appears to be no clear delineation of government and private sector liabilities when it comes to funding economic damages in the aftermath of a disaster.

Due to rather limited financial resources, disaster funds can only reimburse a small fraction of total losses sustained by people affected by disasters. These amounts vary from 10 per cent in Montenegro to 40-60 per cent of damages in Slovenia. Some funds reduce the amount of assistance to be given by the amount of insurance coverage received in the aftermath of a disaster, which provides major disincentives for homeowners and businesses to buy insurance.

The administrative process involved in mobilizing additional resources in cases of major disasters caused by the impact of natural hazards appears to be administratively cumbersome, lengthy and complex, and, as a result, rather time-consuming.

Finally, it is worth mentioning that due to the small and fixed size of annual budgetary appropriations, just like in the case of the EU Solidarity Fund, SEE countries find it difficult to match their available budgetary resources in case of an emergency with potential disaster-related fiscal outlays, which introduces major uncertainty into their fiscal planning process.

The role of public-private partnerships in disaster insurance

So far only two of the EU Member States have created special disaster insurance programmes to reduce the extent of government fiscal exposure to disasters and to provide incentives for disaster risk reduction to businesses and homeowners. These countries are France and Spain[13].

Nat Cat in France

In the case of France, a public-private partnership known as the French "Nat Cat" was established on 13 July 1982 to provide disaster insurance coverage for businesses and homeowners. The Nat Cat benefits from the expertise and experience of the insurance industry in handling claims and from the solvency of the State. Since the Nat Cat guarantee is obligatory, every insured is entitled to benefit from the cover through the extended guarantee on their basic insurance policy. The system covers - via an obligatory extended guarantee on the property damage insurance policy - property located

[13] Of all SEE countries, Turkey is the only country which also created a special disaster insurance pool - the Turkish Catastrophe Insurance Pool (TCIP) - which operates as a national disaster risk aggregating mechanism. For more details on TCIP, see Earthquake Insurance in Turkey by Eugene Gurenko, et al.; World Bank; 2006.

in France and certain French overseas territories. The risk of anti-selection is addressed by the obligatory nature of this extended guarantee.

The existing rules forbid insurers to calculate the price of the guarantee as a function of the real exposure, thus introducing mutuality between those insureds located in the high-risk zones and those in the low-risk zones. Thanks to this solidarity, every insured benefits from a very complete guarantee at a moderate price - approximately €20 per year for the average homeowner.

Another important feature of the French system is a strong link between insurance coverage and mitigation. By increasing the level of deductibles to residents of those communities that have done little to reduce their disaster exposures over time, the Nat Cat introduces strong incentives for proactive risk management, and sets an important model which is worth following in other disaster-prone countries.

Consorcio de Compensation de Seguros of Spain

The Consorcio is the main disaster risk financing vehicle of the Spanish Government and the private insurance market. It was established in 1954 as a State-backed compensation and insurance system, providing extraordinary risk coverage for disasters caused by the impact of natural hazards (such as flood, earthquake, volcanic eruption and storms) and socio-political risks such as war and terrorism. In 1986, the Consorcio stopped being a State institution and became a public business entity reporting to the Ministry of Finance and Economy. The institution has its own legal identity, its own assets independent from the State's, and its activities are subject to insurance regulations. The system is based on the principles of solidarity, compensation, diversification and subsidiarity.

Solidarity is achieved among the insured through mutualization of risk. Diversification is achieved through inter-temporal risk transfer between accounting years, territorial diversity of the insured pool, and the ability to diversify risk by insuring different uncorrelated disasters. Cooperation is realized through a partnership between the public and private sectors. Subsidiarity is achieved through the Consorcio's interventions only when and where the insurance market fails to provide coverage.

Similar to the French Nat Cat, the risk coverage provided by the Consorcio is compulsorily included in the insurance policies of certain lines of business, such as fire, auto, damage to goods, business interruption and personal accident policies. Insurance policies are underwritten and distributed by private insurance companies, whereas the Consorcio acts as a reinsurer. For its coverage, the Consorcio levies a surcharge on the sum insured under primary insurance policies, which varies with the class of business. The surcharge is collected and passed annually to the Consorcio, net of the distribution charge. All property damage claims are subject to a deductible of seven per cent of the amount payable, although this does not apply to vehicles, and residential premises.

Unlike the French system, compensation under the Consorcio's policies does not depend on a declaration of national emergency by the Government. For the indemnification to take place, all that is needed is occurrence of a loss from disasters included in the Consorcio's coverage and timely payment of premium by the insured.

The pool's ability to provide useful service to society has come to light in the aftermath of the March 11 terrorist attacks in Madrid. Over €20 million was paid by the Consorcio to people injured by attacks and relatives of the deceased. An additional provision of €15 million has been made to complete the outstanding claims.

The role of private disaster insurance in disaster risk financing in SEE countries

Despite their severe exposure to natural hazards, SEE countries have virtually non-existent disaster insurance coverage of assets belonging to individuals and small businesses - around 1-4 per cent. As the property and casualty insurance industry in SEE countries is still rather small and relatively undeveloped, a very small percentage of population regularly buys insurance products. Property insurance in general and disaster insurance in particular are no exception. On average, the number of households with a property insurance policy rarely exceeds five per cent, and only a subset of those with property insurance coverage (15-85 per cent) also have disaster insurance protection.

Although the cost of disaster insurance coverage is rather low, on average from €20 to €40, few homeowners buy it. One possible explanation may be that disaster coverage cannot be bought separately in any SEE market but instead has to be bundled with a

homeowners policy. Once combined, the total costs of both coverages can be well in excess of €100 per year, which may create an affordability barrier for many households.

The insured limits under the earthquake and flood policies are often limited to a small percentage of the total value of assets insured under a homeowners policy. This may be yet another explanation of the very limited demand for disaster insurance.

While disaster insurance is available in some form in most markets, in several markets with severe disaster risk exposures it is provided only by a few companies, and even then only on a case-by-case basis, which effectively limits the supply. In addition, due to the small size of disaster insurance premiums collected by insurers, some companies find it difficult to find reinsurance protection, while retaining more disaster risk is not a preferred option. This may be yet another limiting factor on the supply side that prevents companies from marketing disaster insurance coverage more aggressively.

In many SEE countries, it appears that insurance regulators lack the needed tools and expertise in understanding the true risk exposures of regulated companies to disaster risk.

Conclusions and recommendations

Despite considerable risk exposure to disasters caused by the impact of natural hazards, the existing risk financing mechanisms at both the regional and the SEE country level do not have the capacity to address the consequences of large disaster events. Reducing the adverse financial impact of disasters caused by the impact of natural hazards on governments, businesses and households in the SEE countries must be regarded as an important economic and social priority at the national and regional level.

Investing in development of market-based disaster risk transfer systems at both national and regional levels will bring numerous economic and fiscal benefits. In the case of the SEE Governments, national and regional risk transfer programmes will help reduce their contingent fiscal liabilities arising out of their unlimited exposure to natural hazards, will enable them to receive access to immediate liquidity in the aftermath of disaster events, and will help to mitigate the adverse impacts of natural hazards on fiscal stability and economic growth. In the case of households, access to affordable market-based disaster insurance will serve as an important financial safety net that will help millions of homeowners to protect their lifetime savings embedded in their house equity, and hence avoid financial ruin. For businesses, access to disaster insurance and financial weather hedging instruments will reduce the adverse impacts of natural hazards on their earnings, and hence will reduce the cost of borrowing and result in improved business valuations.

Several recommendations emerge which are intended to guide government policymakers in developing and applying national and regional disaster risk financing strategies.

Investing in the development of integrated disaster risk financing capabilities at the national and regional levels. Disaster risk management functions at the country and the EU levels tend to be fragmented and dispersed across different agencies. The function of disaster risk financing is typically reduced to requesting additional budgetary appropriations and disbursing financial assistance to government agencies in charge of relief, recovery and reconstruction work. This function is typically discharged on an ad hoc basis by national ministries of finance in the aftermath of disasters.

These findings suggest that the SEE countries will benefit from building an integrated disaster risk management function at the national level, which would comprise disaster risk reduction, including risk financing. Following the best business practices in large private companies, countries may also consider instituting a position of Chief Country Risk Officer, whose main responsibility would be to identify, assess and manage country disaster risk, through a combination of ex-ante activities in disaster risk reduction and disaster risk financing at the country level, including risk transfer.

Lessening the impact of disasters caused by the impact of natural hazards on government budgets. The 2005 floods in Europe once again demonstrated that large disasters caused by the impact of natural hazards can be very costly and can have major negative impacts on national budgets. The 2005 flood impacts, however, pale compared to the magnitude of loss that can be wrought by a large earthquake. Yet no country in the region has either adequate financial capacity on its own or risk transfer mechanisms in place to cope with the financial consequences of large disaster events.

In this context, the SEE countries should consider instituting a regional disaster insurance pool that would act as a regional aggregator of disaster risk and help countries access the global reinsurance market on better pricing terms. The risk pooling arrangement for the SEE countries can be modeled after the regional disaster insurance facility - the Caribbean Catastrophe Insurance Regional Facility - that was launched successfully by the World Bank in May 2007. The insurance premium payments for disaster risk coverage can be made out of the annual budgetary allocations for emergencies. This would enable countries to limit their annual budgetary exposures to natural hazards by the amount of premium paid to the regional disaster insurance pool.

In addition, the SEE countries should consider taking advantage of another ongoing World Bank initiative - the issuance of a multi-country disaster bond, which would help countries to transfer a part of their fiscal exposure to disasters to the capital markets.

Reducing the financial vulnerability of homeowners and small-and-medium enterprises to natural hazards. Despite major loss potentials from disasters caused by the impact of natural hazards, the study documented an almost non-existent level of disaster insurance coverage among homeowners in SEE countries. Such low levels of insurance penetration can be partially explained by a combination of many factors on both the supply and demand sides. These include the lack of risk awareness, distrust of population in the ability of local insurers to pay claims in the case of a major disaster, reluctance of insurers to actively market disaster insurance coverage on a wide scale due to difficulties with obtaining reinsurance, complexity of internal risk management procedures for disaster risk, and the highly capital intensive nature of the business. In an attempt to explain the low insurance penetration for disaster risk, one can also point out the still rather nascent stage of insurance industry development in the region, and relatively low incomes of most population.

In this context, it may be advisable for many countries of region, particularly larger-size economies exposed to the combination of severe geological and meteorological risks, to consider creating national disaster insurance pools which can provide efficiently priced stand-alone disaster insurance to homeowners and small business owners. As has been demonstrated by international experience, such programmes can provide highly affordable coverage by realizing the benefits of countrywide risk diversification, economies of scale and the ability to obtain better pricing terms from the global reinsurance market. The first country-wide disaster risk pool in an emerging market, known as the Turkish Catastrophe Insurance Pool, was pioneered and successfully launched with World Bank assistance by Turkey in 2000. Similar national disaster risk insurance programmes can be considered and developed with World Bank assistance in other SEE countries.

Mitigating the negative impacts of disasters caused by the impact of natural hazards on businesses. The growing frequency and severity of disasters caused by the impact of natural hazards, particularly of weather-related events, is becoming a major operational risk for many businesses in the SEE region. Yet so far businesses have not taken advantage of the latest financial technologies in the area of weather risk hedging. Despite the fact that the international weather risk market has been rapidly developing, companies in SEE countries have a rather limited access to weather risk hedging instruments that can mitigate financial consequences of weather-related events on their business and help them in their economic adaptation to climate change.

The countries of the region, and possibly of the EU, should consider joining forces to create a regional (and possibly pan-European) market in weather risk hedging instruments - a “weather risk market.” Creation of such a market will allow companies whose bottom lines are affected by the weather to hedge their weather risk by buying weather derivates such as, for instance, heating degree days (HDD) and cooling degree days (CDD) for major cities of the region. Such contracts are already readily available for major United States and European cities. Tradable indices may also be developed for wind and precipitation. The work in the area of weather derivatives has been pioneered by the World Bank in several countries around the world, with India being the prime example. These already-tested product development and low-cost distribution technologies for hedging weather risk can be adjusted to the specific conditions of the SEE region.

Creation of a weather risk market would require regional investments in meteorological data generation and storage capabilities, installation of additional weather radars and weather monitoring stations, the creation of a regional weather risk trading platform, and development of weather market regulations. All these investments, however, must be well coordinated from the start to achieve desired outcomes. In this context, a World Bank-supported regional weather risk market development programme can serve as an effective regional coordination mechanism.

Photo by Christian Baron von der Ropp

3

Emergency Preparedness and Management

Effective preparedness and capacity to respond to disasters caused by the impact of natural hazards and to effectively manage emergencies constitutes a fundamental pillar in the broader concept of disaster risk management. This response and management capacity includes the organization and management of resources and responsibilities for dealing with all aspects of emergencies, and activities and measures taken in advance to ensure effective response to the impact of hazards[14]. The key elements considered in assessing the current status and outstanding needs in the SEE countries are: institutional set-up for emergency management; technical capacities for emergency response; planning, training, communication and information systems; public awareness; and international cooperation.

Country-level challenges

The countries of the SEE region have gone through major political, social, economic and administrative changes, which have affected institutional aspects of their disaster risk management. The primary challenge and focus in restructuring of response functions in the region has been: (i) demilitarization of the civil protection services; and (ii) decentralization of many disaster management functions. These two processes are well advanced and the directions taken in their pursuit is highly commendable. Nevertheless, challenges remain, which these countries must face on their way to effective disaster risk management.

Institutional capacity. Insufficient levels of coordination (both vertical and horizontal) between key relevant institutions comprise a common challenge for the existing disaster management systems in the SEE region. In most of the SEE countries, there is a lack of coordination among relevant agencies and between central and local administrative bodies, which is frequently combined with unclear definitions of roles and responsibilities for disaster management. On this aspect, the establishment of national platforms for disaster risk reduction would facilitate the necessary coordination, as well as the development of national plans addressing disaster risk reduction issues, of which preparedness for response is an important component[15].

The restructuring being undertaken by the SEE countries requires gradual strengthening and incremental capacity-building efforts. The benefit of decentralization in disaster management is widely recognized, but decentralization by itself cannot be considered a single panacea for improvement of disaster management and preparedness. Local-level institutions are often not sufficiently equipped or trained to immediately take over many of the critical functions.

Communication and information systems. It is crucial, for both disaster management and coordination, to establish institutional and information links between national, regional, district and community levels. The countries of the SEE region do not have effective emergency communication systems and disaster management information systems, which would provide accurate and timely information on disaster impact on the ground and on the resources available for response. Knowledge of these two factors is essential for decision-makers and response units, and the effective flow of information between responsible services is crucial for saving lives and properties in the event of disaster. It is important that the communication and information systems which the Governments adopt can not only be applied to all hazards and disaster events of variable scales, but are also easy to operate and can be used on a day-to-day basis by the relevant service units.

Emergency response planning. A number of SEE countries lack comprehensive disaster management plans, or their existing plans are outdated. The disaster preparedness plans should incorporate linkages to international systems of disaster response, and have clearly defined and accepted roles and responsibilities for the national disaster response organizations. These plans should balance both preparedness and mitigation, be based on political consensus within the country, and take into account the regional cooperation and aid available for emergency response.

Technical capacity for emergency response. Effective response to disasters requires well-trained and equipped personnel in key response service units such as civil protection, fire brigades, medical services and specialized search and rescue teams. A number of SEE countries

[14] After ISDR Terminology: Basic Terms of Disaster Risk Reduction, accessible at http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm

[15] To find out more on national platforms for disaster reduction please consult: http://www.unisdr.org/eng/about_isdr/isdr-publications/03-guidelines-np-drr/eng-guidelines-np-drr.pdf

face the common challenge of insufficient and antiquated emergency response equipment. In many localities, the equipment is not adequate even for small emergencies, and certainly does not meet the needs of major disaster events.

Education, training and public awareness. The SEE region has some strong academic institutions, particularly working in the field of seismology. However, their resources, in terms of data and human resources, are not fully utilized for disaster management and preparedness activities. In addition, scientific instruments for monitoring hazards were often damaged during the war in the Balkans, or are antiquated and poorly maintained.

There has been good progress made in training programmes in the past few years in most countries in the region; however, these programmes also need to be tailored to accommodate transboundary issues and cooperation in case of an emergency. Public awareness campaigns and education programmes in schools should be further encouraged, and the use of public media for dissemination extended, so that relevant messages can reach the larger population.

Overall assessment of countries' emergency preparedness and disaster management

The level of preparedness and institutional capacity for disaster management in the SEE countries is presented in table 4 below. The table takes into account 10 basic elements of emergency management and response, and assigns qualitative values for the elements to each country. These values are based on information provided in the national reports on the current status of disaster reduction that were prepared for the 2005 World Conference on Disaster Reduction, held in Kobe, Japan, as well as other country-level documents and presentations prepared for events such as Civil Military Emergency Preparedness Council meetings, SEE Disaster Preparedness and Prevention Initiative (DPPI SEE) regional meetings and the DPPI SEE Bucharest Declaration[16].

Regional coordination and collaboration

Due to the transboundary character of many natural hazards and the cross-sectoral linkages required to manage disaster risks, emergency preparedness and mitigation entails institutional coordination and collaboration within and between neighbouring countries. Coordination and collaboration must occur between entities such as hydrometeorological services, civil protection efforts, fire brigades, the health and educational sectors, and the private sector, within but also between the SEE countries.

Cooperation is of particular importance for countries that share river basins and water resources. Ninety (90) per cent of the area of the SEE countries falls within transboundary river basins[17], and more than half of these basins are shared by three or more States. Related collaboration is beneficial and needed in weather forecasting, early warning, and development of plans for river catchments, including flood protection measures. While many cooperative linkages existed previously between the States of former Yugoslavia, they were broken as a result of war in the Balkans, and require restoration, though in a different format and in the context of the new political and economic situation.

Despite the challenges derived from the political history of the SEE region, there is evidence of a will to cooperate in the area of emergency management, preparedness and response. It is reflected in the participation of SEE countries in a number of ongoing initiatives described in this document. Yet transboundary cooperation can be difficult at times, given the differences in socio-economic conditions, geography, laws and institutions among the countries in the region.

Because of shared risks, high vulnerability and the relatively small size of many countries in the SEE region, it would be efficient for the countries within sub-regions to cooperate in the area of disaster preparedness and

[16] South Eastern Europe Disaster Risk Mitigation and Adaptation Initiative: Risk Assessment in South Eastern Europe - A Desk Study Review; UN/ISDR-WB; 2008.

[17] These include: Danube, Drin, Maritsa/Evros, Neretva, Mesta/Nestos, Sava, Struma/Strimon, Vardar/Axios and others, which flow into the Adriatic, Aegean, Ionian and the Black Seas.

Table 4. Major recent droughts in SEE countries

Country	Decentralized Emergency Management System	Community Participation	Legislative Framework	Training and Education	International Cooperation	Emergency Response Planning	Exercises	Public Awareness	Communication and Information Management System	Technical Capacity for Emergency Response
Albania	N	N	N	S	G	S	N	S	N	N
Bosnia and Herzegovina	N	N	U	N	S	N	N	N	N	S
Bulgaria	N	N	S	N	S	N	N	N	N	S
Croatia	N	N	S	N	S	S	S	N	N	S
FY Republic of Macedonia	N	N	S	S	S	N	N	N	N	N
Moldova	N	N	N	N	S	N	N	N	N	S
Romania	N	N	S	S	G	S	N	N	S	S
Serbia	N	N	U	N	S	N	N	N	N	U
Montenegro	S	S	U	S	S	N	N	N	N	U
Slovenia	S	S	S	S	S	N	S	S	S	S
Turkey	N	S	S	S	G	S	S	S	S	S

G - Good
S - Satisfactory
N - Needs Improvement/Not Available
U - Under Development

Source: South Eastern Europe Disaster Risk Mitigation and Adaptation Initiative: Risk Assessment in South Eastern Europe - A Desk Study Review; UN/ISDR-WB; 2008

response. There is a common recognition that the SEE countries would not be able to cope with a large-scale disaster, individually and by their own means, due to obsolete technical tools. Technical tool problems include outmoded search and rescue equipment and emergency communication tools, as well as the lack of integrated disaster management information systems and of adequate human recourses in recently demilitarized civil protection services, to name just a few gaps. Additionally, taking into account the countries' developmental needs in many key economic sectors, most of them cannot individually afford a stand-by, fully equipped emergency response force with equipment, or large stockpiles of relief materials tailored to each type of natural and technological hazard. The recent forest fires raging through SEE countries are a case in point. Currently, there is much room for strengthening the regional emergency response system and for regional cooperation, which would ensure more efficient response to large-scale disaster events, and potentially could save additional lives and property.

Moreover, a regional approach to emergency preparedness in the SEE region may result in significant cost savings for each State, as not every country would need to store full supplies, materials and equipment or train highly specialized response units for any eventuality. Instead they will know that these are available from neighbouring countries in the event of a disaster.

Currently, there are two key existing regional cooperation initiatives in disaster preparedness in SEE: the Civil Military Emergency Preparedness Council and the Disaster Preparedness Initiative of the Stability Pact.

The Civil Military Emergency Preparedness Council for South Eastern Europe (CMEPC) is a formal structure, established in 2001 through an agreement among most SEE countries, which acts as a consulting and coordinating body for regional cooperation in disaster management. CMEPC advocates development of common standards and procedures to be used by all the nations of the SEE region for planning and response to regional disasters and emergencies. Focusing on transboundary cooperation, CMEPC has drafted an agreement for facilitating border crossing procedures during an emergency. CMEPC also plans to develop and maintain a geographic information system database of the region for emergency response purposes, which will include the region's roads, railways, gas pipelines and airports. CMEPC also aims to develop a common emergency information network.

Disaster Preparedness and Prevention Initiative for South Eastern Europe (DPPI SEE). In November 2000, the Stability Pact for South Eastern Europe launched DPPI SEE in an effort to contribute to the development of a cohesive regional strategy for disaster preparedness and prevention. From the beginning, DPPI SEE aimed to pull together ongoing and future activities to identify and address unmet needs, in order to improve the efficiency of the national disaster management systems and to endorse a framework for regional cooperation. DPPI SEE has been a primary example of regional ownership, with full involvement of regional countries cooperating under the Stability Pact for South Eastern Europe auspices, supported by interested countries, international organizations and agencies (such as the EU, the United Nations Development Programme, the International Federation of Red Cross and Red Crescent Societies, the North Atlantic Treaty Organization, the Swedish Rescue Services Agency and the Danish Emergency Management Agency).

One of the main tasks of DPPI SEE has been to bring the participants' political strategies in line with one another, to coordinate existing and new initiatives in the region and, thereby, to help avoid unnecessary duplication of work. The objective of DPPI SEE has been to:

- Strengthen good neighbourly relations and stability through the exchange of information, lessons learned and good practices in the field of disaster management.
- Enhance cooperation among DPPI SEE partners in view of EU enlargement and the process of Euro-Atlantic integration for SEE countries.
- Support and encourage countries in the region to develop, adopt and/or enforce state-of-the-art disaster emergency legislation, regulations and codes designed to prevent and mitigate disasters in line with guidelines and common practices accepted in the international community.

In July 2005, an office in Sarajevo was established and DPPI SEE was transferred to the regional office. On 24 September 2007 in Zagreb, government representatives of Albania, Bulgaria, Croatia, The Former Yugoslav Republic Macedonia, Montenegro, Moldova, Romania and Slovenia signed a Memorandum of Understanding (MOU) on the institutional framework of DPPI SEE. Serbia signed the MOU in January 2008, and Bosnia and Herzegovina is committed to signing the MOU

after completion of its internal decision-making procedures. The DPPI SEE secretariat was active during the Romanian flood emergency, and the DPPI SEE Executive Director subsequently visited countries in the region to promote DPPI SEE with relevant governmental and international offices. DPPI SEE is also organizing training activities, aiming to improve the coordination work in the region. DPPI SEE has initiated and supported a joint fire fighting system in the region. Through this joint fire fighting unit, DPPI SEE has trained 72 firefighters from Bosnia and Herzegovina, Croatia, Serbia and Montenegro. The firefighters have been equipped with identical firefighting and communication equipment, and have been trained using common international standards (based on the CMEPC handbook), with an overall objective to create joint management and response abilities to fight summer fires, and to demonstrate the capability to cross national borders in order to deal with disasters caused by natural and technological hazards[17].

These regional platforms have advanced SEE regional cooperation in disaster preparedness and developed cooperation protocols among the countries. However, the capacity as well as the actual regional activities are still not fully adequate, and require further strengthening.

Other international initiatives in SEE

In addition, there are also other initiatives supported by international organizations with significant presence in the region which facilitate cooperation between SEE countries in emergency management. Among these are:

European Commission, Environment Directorate General/Civil Protection Unit/ Monitoring and Information Centre (MIC). MIC acts as an information, communication and coordination centre which mobilizes experts and material support from EU Member States and other participating States in case of a disaster. It receives alerts and requests for assistance directly from a disaster-stricken country, and immediately informs the Member States' national civil protection authorities. The European Commission Civil Protection Unit may appoint coordination and assessment experts to travel to the affected sites to identify the response needs and help ensure the efficient delivery and distribution of assistance. MIC also plays a role in strengthening preparedness, through training and exercises. The participation in this mechanism is limited to EU Member States, European Economic Area countries and countries with the pre-accession status; currently, there are 30 countries which are part of this system.

The Council of Europe (EUR-OPA) also provides a platform for European cooperation related to hazards and risk management. The Committee of Ministers of the Council of Europe has set up the intergovernmental Open Partial Agreement in 1987 called the European and Mediterranean Major Hazards Agreement (EUR-OPA). The objective of this agreement is to enhance multidisciplinary cooperation between Member States to ensure better prevention, protection and relief in the event of major disasters due to natural or technological hazards. This agreement was developed in collaboration with the EU, other European institutions and several specialized United Nations agencies. In the scientific and technical domain, research and coordination efforts are supported through the European Network of Specialized Euro-Mediterranean Centres. This platform facilitates cooperation through promotion of knowledge, prevention, risk management, post-crisis analysis and rehabilitation.

United Nations, secretariat of the International Strategy for Disaster Reduction (UN/ISDR) is the focal point in the United Nations system to promote links and synergies between, and the coordination of, disaster risk reduction activities in the socio-economic, humanitarian and development fields, as well as to support policy integration. Responding to current disaster trends and the increased expectations and demands of nations and communities to implement the Hyogo Framework for Action, the ISDR has evolved into a global system of partnership. ISDR is composed of national authorities and platforms, intergovernmental, regional and non-governmental organizations, the United Nations System, international financial institutions, and scientific and technical bodies and networks. This growing disaster risk reduction movement is called "the ISDR system". The UN/ISDR secretariat is responsible for coordinating and servicing the ISDR system. In partnership with the World Bank, it is striving to mainstream disaster risk reduction into poverty reduction and relevant sectoral development strategies in the region through the Global Facility for Disaster Reduction and Recovery, which is designed to facilitate a coordinated approach among donors and partners in implementing the Hyogo Framework for Action.

[18] More information on DPPI SEE is available at http://www.dppi.info

The other international organizations involved in disaster preparedness in the SEE region are: the United Nations Office for Coordination of Humanitarian Affairs (OCHA), the International Search and Rescue Advisory Group (INSARAG) and the United Nations Disaster Assessment and Coordination (UNDAC), the International Federation of Red Cross and Red Crescent Societies (IFRC), the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the Office of the United Nations Disaster Relief Coordinator (UNDRO), and UN-HABITAT: Risk and Disaster Management Unit (RDMU).

Conclusions and recommendations

Emergency management and preparedness increases countries' ability to respond to disasters effectively. Based on an analysis of a country's hazard exposure and emergency management capacity assessment, the key question prior to investigating available options for actions is whether and to what degree the country is prepared to respond to the major disasters to which it is prone.

Based on the assessments carried out under this and other studies, the SEE region has undertaken many reforms of its emergency response systems, but it is still in need of improvement in the following areas:

Institutional and regulatory structure. The institutional set-up in many SEE countries, while it has already been modified, may still require further review and adjustments to ensure better synergies and collaboration between institutions.

Emergency response planning. In some countries, these plans are either outdated or strictly sectoral. Joint planning by all relevant units would be more effective. These plans should be regularly updated based on field exercises.

Communication and emergency information management systems. Advancements in information and communication technologies now allow for better coordinated and managed response to disasters; the SEE countries should take advantage of available tools.

Emergency response equipment. The technical capacity of response units is crucial for prompt and effective response to disasters of various origins. Many SEE countries are in acute need of better equipment for civil protection, fire brigades and emergency health units.

Public awareness and training. More needs to be done to educate the populace of the measures to be taken before, during and in the aftermath of a disaster. Regardless of the speed in response by specialized units, the affected people are usually the first responders, and therefore their education on the subject of disaster mitigation and response is very important.

Coordination and cooperation at the country and regional levels. Coordination is the key and common denominator for improvements in all components of emergency management and response. There are indications of progressing efforts to ensure better coordination within the SEE countries' institutions and initiatives to enhance the regional cooperation, which need to be further strengthened.

Photo by Camil Tulcan

4

Hydrometeorology in South Eastern Europe

The SEE region is vulnerable to severe storms, floods, droughts and climate change. Weather warnings and flood forecasts could mitigate a significant share of disaster-related losses by enabling preparatory measures, but these tools are not as effective as they could be, because the region's monitoring network is sparse and in many places depends on obsolete instrumentation. Not only is better infrastructure needed, but also stronger institutions: no SEE country can forecast storms and floods or manage the region's navigable rivers without adequate data exchange with neighbouring countries.

The SEE region has historically been a high-capacity region in hydrometeorology, with well-equipped networks in hydrology, agrometeorology and other specialties; at the cutting edge in numerical weather prediction; and an early implementer of hydrological management from a river basin perspective. But hydrological and meteorological monitoring networks were seriously damaged by the civil strife and wars of the 1990s, exacerbating the natural deterioration of networks that have received little investment since that same time. Upper-atmosphere sounding tools, which are the backbone of global forecasting, are sparse today and do not meet World Meteorological Organization (WMO) standards for spacing. Surface weather networks in the SEE region are also too sparse to meet WMO spacing standards, and instrumentation is in some cases 60-70 years old. Hydrological networks do not facilitate compliance with the EU Flood Directive and Water Framework Directive, the EU legislative frameworks for flood risk management and water protection. Bosnia and Herzegovina's agrometeorological network was destroyed in the war and has not been rebuilt.

No SEE country has adequate meteorological radar capacity: Croatia would like to better monitor the Adriatic Sea; Serbia's radars at present are principally oriented toward hail suppression; the Former Yugoslav Republic of Macedonia's are very old; and there are no meteorological radars in Moldova, Albania, Montenegro or Bosnia and Herzegovina. Telecommunication capacity is a serious problem; hydropower-dependent Albania lacks telecommunication capacity to maintain contact with hydroposts in upper watersheds, and must prepare hydrological forecasts without data that would be extremely useful. Neither Albania nor Moldova at present computes high-resolution local area models for use in operational forecasting of precipitation, although precipitation in the coastal/mountain countries of the SEE region is among the most extreme and variable in Europe and Central Asia. The Bosnia and Herzegovina hydrometeorological entities also lack modelling capacity.

Together with infrastructure, institutions for data-sharing within the SEE region declined in the 1990s. In part, this was an unintended consequence of the political changes that dissolved the former legal and institutional basis for data sharing arrangements. To a great extent, however, it was also a consequence of lack of financing. Regional data exchange is constrained today by broken or uncertain links between national meteorological systems and regional hubs. Regional agreements to share data in the event of emergencies remain unrealized on the ground for lack of technical work to select the thresholds of hydrological or meteorological anomalies that should prompt sharing.

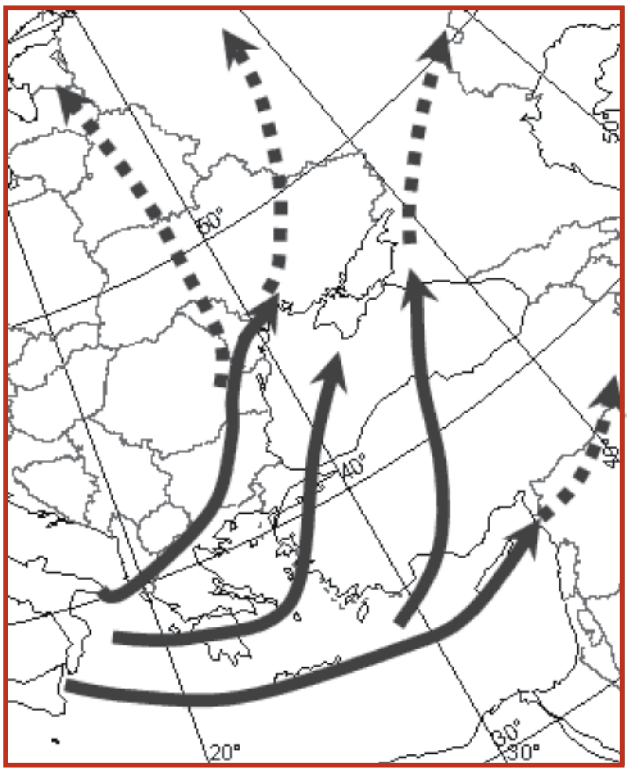
The infrastructural and institutional constraints on development of effective disaster warnings in the SEE region have emerged against a global background of improving, longer-lead-time forecasts used to optimize agriculture, energy production and distribution, water resources management and other sectors. Improved forecasts depend on strong networks and cooperative efforts: calibrated, real-time, and continuous data from dense networks over ever-larger areas; continent-wide radar composites; high-resolution weather models; hydrological models that take radar data and high-quality weather forecasts as input; forecaster workstations able to overlay and facilitate interpretation of satellite, radar, model, and real-time monitoring data; and other advances.

European meteorological infrastructure entities coordinate these efforts. Within Eumetnet, a network grouping 24 European national meteorological services, instrument standards are jointly set, which allows for combined projects; in an example of particular importance, radar networks contribute to a European "mosaic" (a map picture formed from combining images). Eumetnet has deployed meteorological satellites optimized for Europe. The European Centre for Medium-range Weather Forecasting (ECMWF) provides forecasts from three to ten days, and longer periods, and in several time ranges.

The SEE region would benefit from capacities such as these as much or more than the rest of Europe, considering the natural variability of its weather. Moreover, the SEE region could make a valuable contribution of its own to the hydrometeorological security of Europe. As shown in figure 3, Mediterranean cyclones can strike Europe across the

Figure 3

Trajectories of Southern / Mediterranean cyclones



Source: Ogonesyan (2006). Presented in "Weather/Climate Services in ECA: A Regional Review"; World Bank, 2008.

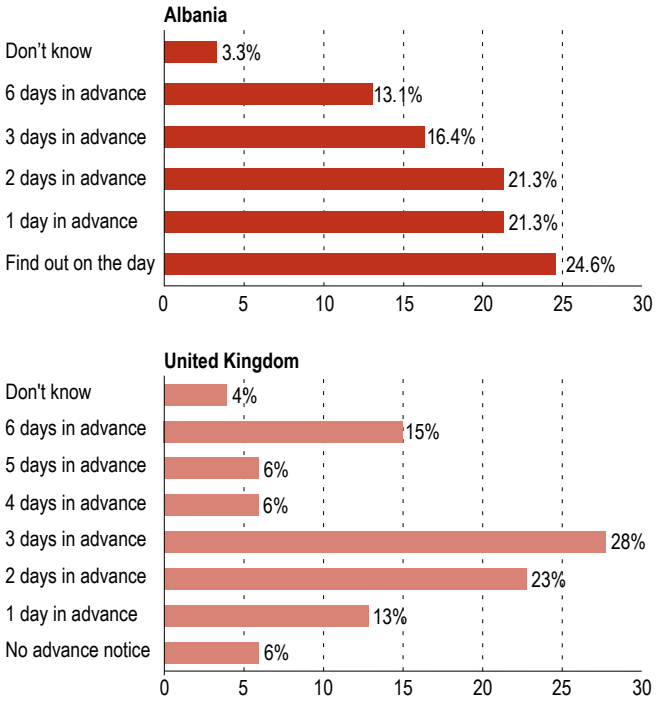
Balkan Peninsula. Even when such storms are not underway, the SEE region is at the front line of passage of atmospheric events, which change as they pass over the mountains and densely varied topography and land use of this region.

Better storm forecasts would support the economies of all countries affected by severe weather patterns, for skilled forecasts provide lead times for warnings on dangerous events and can limit storm damage. Forecasting of severe weather enables emergency management teams to be put in place, and response and evacuation to be undertaken. According to the United Nations Department of Economic and Social Affairs, et al., up to 35 per cent of flood damage can be mitigated in light of flood warnings[19]; in the United States, as little as one hour of lead time can result in a ten per cent reduction in flood damages[20]. But public surveys undertaken within the scope of this study indicated that, in many cases, little lead time is supplied. In a survey carried out in Albania, 25 per cent of respondents found out about the most recent severe weather they could recall on the day it occurred, compared to six per cent in the United Kingdom (see figure 4). Weather events are different from country to country, and to some extent these statistics do not refer to similar events. Nevertheless, available data suggests a great disparity in severe weather warning lead times that cannot be remedied without reinforcement of national and regional weather services; remedying the shortage of data from surface weather stations, hydrological posts, radar and upper atmosphere sounding; and addressing the lack of up-to-date information technology capacity, including forecasting workstations, telecommunications, and modelling. With such reinforcement, the SEE region monitoring network could make a very useful incremental contribution to forecasting elsewhere in Europe.

In recent years, efforts have been made to close the SEE region's gaps in hydrometeorological capacity and cooperation. Agreements have been struck to re-initiate data sharing in meteorology and hydrology.

Figure 4

Recalling the last severe weather you experienced,how far in advance did you find out that the severe weather was expected?



Source: For Albania: Albania Public Opinion Survey - Severe Weather Warning. Undertaken for the World Bank, 2007. For the United Kingdom: Met Office National Severe Weather Warning Service (NSWWS) Study - March 2005.

[19] Guidelines for Reducing Flood Losses; DESA, ISDR and USA NOAA; 2004.

[20] Use and Benefits of the National Weather Service River and Flood Forecasts; National Hydrologic Warning Council; 2002.

- Important among these was the agreement in principle among the national meteorological and hydrological services, undertaken at a meeting of the Informal Conference of South Eastern European Hydromet Directors (ICEED) in Sarajevo in 2005, to share needed data. However, the agreement has not been operationalized for lack of technical detail.

- In 2006, the ICEED in Dubrovnik agreed to develop - in collaboration with the World Bank, WMO and the European Commission - a study that would take a regional approach to investigating the status of and need for meteorological, hydrological, environmental and related information sharing; assessing the national meteorological and hydrological services' capacity needs; and identifying key socio-economic benefits; to provide a clear rationale for an appropriate level of national governmental support.

- The countries of the Sava River basin have also prepared to undertake cooperation in river basin management. The Sava River, the biggest national watercourse of former Yugoslavia, was managed from the basin point of view in the 1990s, when it was the national river of one country. Today, it is a major international river whose basin area is shared by six States: Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia and Slovenia. To rebuild the cooperative institutions required for sound management, the Sava Initiative was born following the signature of the Stability Pact in 1999, whereby the Governments of the countries sharing the Sava River basin agreed to engage in a process to reinforce cooperation at the basin level. Preparatory meetings were held in 2003 and succeeding years, respectively, in Dubrovnik, Sarajevo, Belgrade, Ljubljana, and in Podgorica, to prepare a plan for regional cooperation.

Conclusions and recommendations

Drawing together these initiatives, a collaborative effort undertaken by ICEED, the WMO, the World Bank and the UN/ISDR secretariat, in close collaboration with the European Commission, Enlargement Directorate General, is underway to consider a regional approach to infrastructural networks, databases and institutional arrangements needed to support hydrometeorological forecasting in the SEE region. Initial recommendations were presented in Zagreb, October 2007, to a meeting of representatives of meteorological and hydrological services of countries concerned[21], WMO, the UN/ISDR secretariat, the World Bank and the International Sava River Basin Commission.

Networks. The region stands in need of strengthened weather and hydrological monitoring networks that meet WMO spacing standards, and a network of hydrological stations that would enable compliance with the EU Water Framework Directive and the EU Flood Directive. While an economic case can certainly be made to demonstrate the value to each country of a stand-alone investment in a solitary national network, the value to each country of access to a wider, shared network of observations would be far greater.

Regional centres of excellence. The creation and operation of regional excellence centres may offer an efficient regional solution for improvement of national observing networks. The examples of such initiatives are provided by: the Drought Management Centre for South Eastern Europe in Ljubljana, Slovenia; the Climate Change Centre in Belgrade, Serbia; or the planned Marine Forecast Centre in Split.

[21] Bosnia and Herzegovina (both Entities), Croatia, Macedonia, Moldova, Montenegro, Serbia, Slovenia.

Managing the Sava River in compliance with the EU Water Framework Directive. Effective management of the Sava River basin can succeed only through a cooperative regional effort. It should include Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro and Albania, providing support to achievement of effective flood management, safe navigation and sound water resources management in the basin in accordance with the EU Water Framework Directive and the EU Flood Directive. A real-time database can be envisioned that would enable flood forecasting in the short term and a restoration of support to navigation over the medium term.

As for navigation, a special mention should be made of an initiative spearheaded by the Sava River Commission that aims to map and clear detritus (a consequence of the war years) from the river bed, providing one part of the solution to reinvigorating navigation of the Sava. In this context, it would be particularly valuable to initiate work on a database for management of the Sava River, ensuring that information support to Sava navigation is available when the river bed is cleared. This effort cannot succeed without participation of all countries sharing the Sava River basin.

Of notable importance is the role of Bosnia and Herzegovina, which comprises the upper watershed of several important tributaries which together form the largest share of the total watershed. These tributaries cross the territory of the Federation and of the Republic of Srpska before joining the Sava River. It is necessary for sound management of the Sava River that data exchange between the hydrometeorological services based in Sarajevo and Banja Luka becomes fully operational.

Regional radar composite image. Radar is needed to "nowcast" storms and to forecast floods based on measured precipitation. In the case of severe weather alerts, one principal need is for a regional radar composite image. Coverage of each national area would cost approximately half as much if taken within the scope of a regional radar network, rather than as national stand-alone efforts. Even more important than the reduced cost of national imagery is the greater value to forecasters of regional composite images to support nowcasting of severe storms, compared to the value of images only covering the national airspace. Again, such a composite would be a notably useful addition to the European radar composite image coordinated via Eumetnet and OPERA (a Eumetnet programme that facilitates the exchange of expertise on operating weather radars and helps to harmonize and improve the exchange of weather radar information between national meteorological services).

Other recommendations. International experts as well as ICEED members have noted with strong concern the scattering of hydrometeorological functions among multiple institutions (e.g., not only the entity responsible for severe weather warnings, but also among separate entities for aviation and military clients). These institutions often do not share data that is self-evidently in the broad national interest. These agencies divide the scarce resources, visibility and international support available to hydrometeorological services. The unlikelihood of a financially viable, sustainable solution that maintains this scattered structure was also noted.

The highest-priority recommendation is reinforcement of information technology capacity, including especially data management, an up-to-date hydrological model of the Sava Basin, and numerical weather modelling, among other issues. Some of these key information technology tasks, including the radar composite mentioned above, could be most cost-effectively undertaken on a sub-regional level. Where telecommunications systems are lacking to bring data into national centres or regional hubs, or to facilitate regional data exchange, they are also a key need.

Photo by Camil Tulcan

5

Disaster Risk Reduction and Adaptation

Disaster risk reduction involves a proactive and strategic approach to managing disaster risk, whether derived from weather conditions and climate change, or of geological and biological origin. Loss of life and the economic impact of disasters can be reduced by advance planning and investments. Since disasters can set back the developmental gains achieved by the SEE countries, and the available scientific knowledge indicates that more frequent and severe climatic conditions may further contribute to their vulnerability, there is a need to undertake disaster risk reduction actions and to incorporate them into the agendas of SEE Governments.

Experience from many countries shows that disaster risk reduction pays off and is cost-effective. For example, the USD 3.15 billion spent on flood control in China since 1960 is estimated to have helped avoid losses of about USD 12 billion. A study undertaken by the Organization of American States' Caribbean Disaster Management initiative looked at infrastructure projects that failed due to disasters caused by the impact of natural hazards. It found that efforts to enable the infrastructure to survive the disasters would have increased costs only by 1-12 per cent. A 1998 study commissioned by the United States Federal Emergency Management Agency estimated that mitigation increases construction costs in the United States by only 1-5 per cent[22].

The costs of disasters are not only financial, but also humanitarian, social and environmental, and hence often difficult to fully quantify. Also, the benefits of some disaster risk reduction efforts may be realized only in the long term (when a disaster strikes in the next generation) which may discourage governmental investment[23].

Yet, the costs of inaction and lack of investment in disaster risk reduction by far outweigh the costs of potential investments. The importance of disaster risk reduction is further highlighted by the current knowledge of climatic changes. It should be noted that the level of disaster risk management in the SEE countries is not sufficient even for the countries' current risks; therefore, disaster risk reduction efforts need to be intensified in light of the already observed and projected climatic changes that are increasing the frequency and severity of disasters. The pressure on land and settlement patterns are two other factors contributing to the SEE region's vulnerability.

For the purpose of the following discussion on key risk reduction measures for the SEE region, hazards have been grouped into two categories: those projected to be exacerbated by climatic changes, and geological hazards, which are minimally affected or unaffected by changes in weather patterns. The disaster risk reduction measures for the first group of hazards are discussed in the context of broader adaptation to climatic changes. The ISDR promotes a holistic, integrated, cross-sectoral approach to climate change adaptation guided by the five priority areas of the Hyogo Framework for Action. Strengthening community risk awareness, education and training are relevant aspects related to adaptation as well as the need to reflect the local dimension. The following discussion focuses on the SEE countries' specific needs and, therefore, highlights actions most relevant to the region.

Disasters resulting from the impact of weather-related hazards

As discussed in the previous sections, climate change in the SEE region is expected to result in an increase in disaster risks, arising from more frequent and severe floods, droughts, storms and extreme temperatures. The impact of disasters will be further determined by land-use patterns, i.e. it will be more severe where there are no effective instruments for regulating and enforcing land-use plans and construction codes, particularly in known disaster-prone areas.

Many of the required climate change adaptation measures, such as risk assessment and early warning systems, are, in practice, disaster risk reduction activities. A range of traditional disaster risk reduction measures is readily available to reduce the risk arising from climate variability and change, such as better urban and land-use planning, construction of safer buildings, education and public awareness. Below is a description of some relevant activities that can be undertaken to reduce climate-related disaster risks.

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22 Mainstreaming Hazard Risk Management into Rural Projects; Jolanta Kryspin-Watson, Jean Arkedis, Wael Zakout; World Bank; 2006.

23 Measuring Mitigation: Methodologies for Assessing Natural Hazard Risks and the Net Benefits of Mitigation - A Scoping Study; Benson, C. and Twig, J; 2004.

Flood risk reduction

Flood hazard impacts, in particular, are a common cause of disasters in the SEE region. Countries like Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Moldova, Romania, Serbia and Montenegro are highly vulnerable to floods, and have a high frequency of recorded flood events.

Non-structural risk reduction measures against property damage and loss of lives allow for better land-use planning, through hazard maps and knowledge of disaster risks into local development processes, as well as setting enforceable legal mechanisms to discourage settlements in flood plains. Other disaster mitigation measures of key importance are flood forecasting and early warning systems. Flood forecasting and warning systems combine meteorological data with measurements on the water level in rivers and reservoirs, which provide data for public warnings of approaching floods.

Because the SEE region is relatively small, and many of the countries have small territories, cooperation and active real-time data sharing could bring significant savings in flood risk reduction investments and operation costs. If many of the investments could be undertaken jointly, the investment costs would decrease and the countries could benefit from cooperative maintenance of hydrometeorological systems (see the section on "Hydrometeorology in South Eastern Europe").

The main structural measures to protect against floods are likely to continue to be reservoirs and dykes in highland and lowland areas[24]. However, new reservoir construction is being increasingly constrained in Europe by environmental regulations and high investment costs. Other planned adaptation and flood mitigation options are becoming more popular, such as expanded flood plain areas, emergency flood reservoirs, and preserved areas for flood water and flood warning systems, especially for flash floods.

As an example, the Poland Odra River Basin Flood Protection Project, financed by the World Bank and EU funds, will protect 2.5 million people currently at risk against loss of life and property. The project involves construction of a dry polder (a piece of low-lying land reclaimed from a water body and protected by dykes) on the Odra River, enabling reduction of the flood peak downstream from the reservoir and allowing better control of the operation of the river system.

Other principal strategies to lessen the risks of flooding include public flood warning systems, evacuations from lowlands, waterproof assembling of hospital equipment and the establishment of decision hierarchies between hospitals and administrative authorities. Another basic structural disaster mitigation measure is the improvement of construction techniques, so that buildings and infrastructure are more robust in the face of extreme climate events.

Sea level rise - a climate change-specific hazard - poses challenges for flood protection in coastal areas. Coastline protection for sea-level rise is needed for coastal plains/deltas of the Mediterranean, Caspian and Black Seas. Adaptation strategies on low-lying coasts have to address the problem of sediment loss from marshes, beaches and dunes. Regarding coastal tourism, the protection of resorts from sea-level rise may be feasible by constructing barriers or by moving tourism infrastructure further back from the coast.

A key element of adaptation and disaster risk reduction strategies for coastlines is the development of new laws and institutions for managing coastal land. No EU Directive exists for coastal management, although EU Member Governments were required to develop and publish coastal policy statements by 2006. The lack of a Directive reflects the complexity of socio-economic issues involved in coastal land use and the difficulty of defining acceptable management strategies for the different residents, users and interest groups involved with the coastal region. Many countries in Europe, however, have developed detailed shoreline management plans that link adaptation measures with shoreline defence, accommodation and retreat strategies. According to the Intergovernmental Panel on Climate Change, the SEE region has been slower to follow this pattern, and management approaches are fragmented.

Extreme temperature and wildfire risk reduction

Risks posed by weather extremes require societal preparedness. Primary adaptation measures to heatwaves include the development of health early warning systems, education and preventive emergency plans. After the heatwave of 2003, several European countries, including Hungary, implemented early warning systems for heatwaves.

[24] Hooijer et al., 2004.

A key risk deriving from heatwaves and dry conditions is that of wildfires. Forests in Europe that are already moisture-limited or temperature-limited will have greater difficulty in adapting to climate change. Fire protection will be an important component in the SEE region in protecting forests and grassland, particularly in the Mediterranean area. Recent wildfires in the summer of 2007 have highlighted the fact that losses and long-term environmental consequences of forest fires are increasing in the region, and that comprehensive fire safety measures need to be adopted.

Regulations and their enforcement regarding settlement in the proximity to forest areas, and diversification of tree species composition, are both cost-efficient measures to prevent wildfires. An example of the effectiveness of stringent construction and landscaping regulations is provided by some suburban divisions in the southern California area of the United States, where such laws have been locally adopted. While wildfires raged in the state of California in October 2007, with devastating consequences for the over 2,000 homes which were destroyed, those divisions with strictly enforced fire safety regulations stayed almost intact. The wildfires devastated surrounding areas where the laws were more lax. The basic requirements enforced at the local level in southern California involved elements such as non-flammable roofs, indoor sprinklers and regulated proximity of trees and shrubs to the house.

Fire protection measures include also the replacement of highly flammable species, regulation of age-class distributions, and widespread management of accumulated fuel, eventually through prescribed burning, as well as changing the species composition of forest stands and planting forests with genetically improved seedlings adapted to a new climate, and extending the rotation period of commercially important tree species to increase "sequestration" (the storage of carbon). Deciduous trees may be better adapted to the changing climate. The introduction of multi-species planting into currently mono-species coniferous plantations can also be beneficial.

Drought risk reduction

In Southern Europe, to compensate for increased climate-related risks such as a lowering of the water table, salinization and species loss, a lessening of the overall human burden on water resources is needed. This could involve a variety of solutions. Strategies include stimulating water-saving in agriculture, introducing water-saving drip irrigation systems, relocating intensive farming to less environmentally sensitive areas and reducing diffuse pollution, increasing the recycling of water, increasing the efficiency of water allocation among different users, both urban and rural, and favoring the recharge of aquifers and restoring riparian vegetation.

The projected increasing shortages of water will affect both rural and urban areas. Water conservation efforts will be very important in agriculture and in urban settings.

Agriculture will have to cope with increasing water demand for irrigation in Southern Europe, and with additional restrictions due to increases in crop-related nitrate leaching. Irrigation water demand may be reduced by introducing crops more suitable to the changing climate. Short-term adaptation of agriculture in Southern Europe may include changes in crop species (e.g., replacing winter with spring wheat) and cultivars (plant varieties that are produced by selective breeding for traits such as higher drought resistance and longer grain-filling).

The agriculture sector in the SEE region will face many challenges over the coming years, such as international competition from liberalization of trade policy. Climate change will add to these pressures and will make the challenges more difficult. The reform of EU agricultural policies will be an important vehicle for encouraging European agriculture to adapt to climate change, to mitigate drought risk and to reduce the vulnerability of the agricultural sector.

Freshwater abstraction, or water removal from any source, either permanently or temporarily, is growing slowly in Southern Europe. There are many pressures on water quality and availability, including those arising from industry, urban areas, households, tourism and agriculture. Supply-side approaches such as wastewater reuse and desalination are being more widely considered, but their popularity is reduced by health concerns related to using wastewater, and by the high energy costs of desalination. Some planned demand-side strategies are also feasible, such as household, industrial and agricultural water conservation, the reduction of leaky municipal and irrigation water systems, and water pricing.

An example of a unique European approach to adapting to water stress is that regional and watershed-level strategies to adapt to climate change are being incorporated into plans for integrated water management, while national strategies are being designed to fit into existing governance structures.

Geological hazard risk reduction

Many of the countries of the SEE region are prone to earthquakes, due their location in the Mediterranean/Transasian and the Vrancea seismic zones. The region is also vulnerable to landslides, which can be triggered by both floods and earthquakes. The risk of landslides is also exacerbated by land-use and river basin management practices. These geological hazards can be mitigated through a number of measures, summarized below.

Seismic risk reduction

The seismic safety of future construction can be addressed through land-use planning, resistant designs and construction, building regulations and permitting systems, and enforcement of urban plans and building codes. The safety issue is particularly important in the fast-growing and often unregulated urban development areas of SEE countries. Technical and legislative studies and pilot programmes are needed, aimed at better formulation of urban development plans and legal frameworks so that they take into account natural hazards, as well as to enable enforcement of the existing or newly formulated building codes and urban development plans.

The key structural seismic risk reduction measure for the existing built environment is seismic retrofitting. The purpose of strengthening already-built structures is to prevent loss of lives and injuries sustained as a result of displaced or collapsing buildings. In addition, in the case of certain types of public facilities, such as hospitals and emergency response services, retrofitting helps ensure that they can continue their operations in the aftermath of a disaster. The alteration of building structures allows for better resistance to or absorption of seismic forces. In some cases, when buildings are of key importance in emergency response or social functions (such as schools), and where seismic strengthening is not technically or economically feasible, the relocation and reconstruction of vulnerable structures has to be considered. Actual investments in the seismic strengthening of buildings have to be preceded by a thorough prioritization process to be carried out by the relevant government, based on a comparison of vulnerability analyses, as well as population and assets at risk, to potential costs.

Two World Bank-supported projects may serve as examples of implemented seismic retrofitting programmes: in Turkey, the Istanbul Seismic Risk Mitigation and Emergency Preparedness project, and in Romania, the Hazard Risk Mitigation and Emergency Preparedness project. In both countries, the World Bank provides financial support for seismic retrofitting of public buildings at high risk, including emergency hospitals, emergency response facilities, educational facilities and other essential public buildings. Most buildings included in these investment projects play critical roles in the aftermath of a disaster event in safety and emergency recovery efforts. The projects also support the introduction of innovative seismic retrofitting methods in a number of pilot buildings, and training programmes for the engineering community.

So far, there are no successful tools or methodologies with which to predict earthquakes. Contemporary seismic monitoring network operators can identify large earthquakes merely somewhere from seconds to one minute before they begin. This time does not allow for early warning, for the public and authorities to take any meaningful actions. Nevertheless, operation of seismic networks in the high-risk areas is important for earthquake mapping, construction and retrofitting standards, and building code development, as well as for formulation of regulatory frameworks for urban development within seismic zones in earthquake-prone countries.

There used to be a well-developed seismic monitoring network in the former Yugoslavia, but at this point, it has deteriorated and requires enhancements, though in a different organizational and political setting. Since the SEE countries are located on shared fault lines, the linkages between neighbouring countries and information-sharing of monitored data are very important.

Landslide monitoring and mitigation

Landslides often occur as hazards associated with other hazard events, and can be triggered by floods and earthquakes. As with earthquakes, the occurrence of landslides and their precise locations are difficult to predict. A key to landslide risk reduction is risk mapping, spatial planning which helps to discourage settlements in landslide-prone areas, and environmental management (e.g., aforestation, or establishing forests

by planting or seeding in non-forest land). The critical measures to undertake in the SEE countries prone to landslide risk are: carrying out vulnerability studies in selected areas; production of geographic information system maps which include data on morphology, hydrogeology, land use and soil type; and development of alternative land-use plans; as well as stabilization erosion control works in selected cases, where it is economically and technically feasible.

Conclusions and recommendations

There are a variety of disaster risk reduction tools from which decision makers can chose in their efforts to protect the population of the SEE region. This discussion highlights those identified as most relevant for the region; the full range falls under the five priority areas of the Hyogo Framework for Action. Investment decisions should be based on multi-hazard disaster risk management strategies and comprehensive action plans[25].

"Soft" investments. As a first step in their disaster risk reduction efforts, the SEE Governments can undertake relatively inexpensive but effective "soft" investments, such as strengthening the laws and regulations regarding construction, land management and urban planning; better enforcement of building codes and land-use plans; and augmenting institutional capacity and training programmes.

Regional cooperation. Hazard mapping, monitoring and warning systems entail larger investments, but should be considered priorities for particularly vulnerable areas. Regional cooperation on the data-sharing and sub-regional design for such systems may reduce the costs per participating country.

Structural mitigation measures. Most of the discussed structural disaster mitigation measures require significant budgetary resources. The SEE Governments will need to prioritize their investments, in relation to the available resources, through in-depth analyses of vulnerabilities and at-risk populations, as well as the costs and benefits of various options.

Adaptation. Adaptation to climatic changes causing occurrence of more frequent and severe disasters becomes a necessity; therefore, development activities need to take into consideration the changes in weather conditions in the SEE region. The adaptation measures discussed in this report will require a long-term commitment, and are likely to be expanded with further advancements in knowledge and scientific research.

[25] Preventable Losses: Saving Lives and Property through Hazard Risk Management; Christoph Pusch, The World Bank; 2004.

Photo by Camil Tulcan

6

Disaster Risk Reduction and Adaptation Framework

While SEE countries have recognized the importance of disaster risk reduction, most of them do not have a comprehensive disaster risk reduction and adaptation strategy. The development of such a programme framework would be strongly facilitated by the establishment of national platforms for disaster risk reduction. The platforms would facilitate coordination among key players and enable the development of national plans addressing disaster risk reduction issues[26].

This report proposes, below, a potential programme framework, which would provide support to the development of a comprehensive disaster risk reduction and adaptation strategy for the SEE region[27]. As a next step, the proposed framework identifies the following set of activities, aimed at reducing the risk of disasters and at strengthening preparedness and response capacity in the region over the next few years.

1. Disaster risk mitigation. The region needs to invest in the protection of vital infrastructure from key disaster risks, taking into account the increased vulnerability resulting from climate change. Disaster risk mitigation could include flood control, as well as retrofitting of buildings, bridges, lifelines and other key infrastructure to resist floods and seismic shocks.

2. Disaster risk insurance and hedging instruments. SEE countries need to develop disaster risk financing and weather risk hedging instruments to reduce the financial vulnerability of governments, businesses, and households to the adverse impacts of geological hazards and climate change, through development of market-based risk transfer mechanisms.

3. Adaptation. Adaptation becomes essential to ensure that development activities take into consideration the ongoing changes in weather conditions in the region. Adaptation measures include changes in agriculture practices, revisions of building codes and land-use plans, water resources management, and steps involving the education, health and power sectors.

4. Disaster preparedness. Countries in the region need to develop their own local capacity for disaster response, as well as to strengthen regional cooperation in weather forecasting, flood early warning systems, forest fire fighting, civil protection, and emergency management information and communications systems. Close regional cooperation will enable the SEE countries to share information and to help each other respond to large-scale disasters.

While greenhouse gas reduction is a very important pillar in the mitigation of climate change, it is not part of the proposed programme framework, as other operations in the region address this issue in a focused and systematic manner.

Proposed framework programme objective and components

The objective of SEEDRMAP, as proposed, is to reduce the vulnerability of the SEE countries to natural hazards and to reduce human, economic and financial losses due to disasters caused by the impact of natural and technological hazards.

SEEDRMAP has been designed to provide financing for investment priorities in disaster risk reduction, risk transfer and adaptation at the regional and country levels. To address the uniqueness of country vulnerabilities and response mechanisms, the Programme would have the built-in flexibility to accommodate requests for different types of lending projects that may meet best the climate adaptation and disaster risk management needs of each country. Despite a rather broad range of activities that would be eligible for World Bank financing under SEEDRMAP, to ensure its effectiveness, Programme deployment would occur in two phases, and its components and activities would constitute a menu of options from which SEE countries may select those that are relevant to their particular disaster risks and vulnerabilities.

The first phase would provide financing to soft (non-structural) and less expensive measures that can have significant positive impacts. These include activities

[26] To find out more on national platforms for disaster reduction please consult: http://www.unisdr.org/eng/about_isdr/isdr-publications/03-guidelines-np-drr/eng-guidelines-np-drr.pdf

[27] Please note these recommendations are those identified as most relevant for the region; the full range falls under the five priority areas of the Hyogo Framework.

and investments that can build the capacity of SEE Governments to reduce the risk, prepare and to respond efficiently to disasters, such as weather forecasting and early warning systems, development of disaster insurance schemes, land-use planning and building code enforcement, and development of disaster risk reduction and adaptation strategies.

The second phase would extend financing to structural investments that can protect the population from disasters caused by the impact of natural hazards. The investments in this phase could include mitigation measures such as flood control, retrofitting of buildings and infrastructure, and relocating communities who live in flood plains. This phase would also extend funding to adaptation measures such as power grid enhancement and coastal zone management. Since the second-phase investments will be rather significant, the development and approval of a country-level comprehensive disaster risk reduction and adaptation strategy, which identifies priority actions, will be a trigger for advancement to the second phase of the Programme.

Both phases would include contingency funding to provide immediate liquidity in the aftermath of a disaster, and to act as backstop capital facilities for disaster insurance programmes.

Successful implementation of several activities, such as weather forecasting and flood early warning systems, will depend on agreement among the Member States to share information using standard formats. Therefore, such components of the Programme will be designed at the regional level, but the implementation will be executed in the individual countries.

Phase I: Non-structural measures

Phase I would support non-structural measures which are less expensive than the structural ones, but have potential for high impact in reducing the vulnerability of countries and communities. This phase would consist of the following components:

Component A: Development of national disaster risk management and adaptation strategies. Component A would support the development of comprehensive disaster risk management and adaptation strategies in the SEE countries, which would include sectoral reviews and multi-sector analyses involving all key stakeholders. The reviews would provide recommendations for organizational and legislative improvements and priority investments in adaptation and disaster risk reduction, which may be supported in Phase II of the Programme.

Other non-structural investments which may be supported under this component include: (i) risk assessments; (ii) hazard mapping; and (iii) revisions in land-use planning guidelines and construction regulations.

Component B: Disaster risk financing and hedging instruments. All projects funded in this component would be selected on the basis of their clearly demonstrable potential to reduce the financial vulnerabilities of governments, businesses, and individuals to the adverse impacts of hazards and climate change through market-based risk transfer mechanisms (such as disaster insurance and weather derivatives)[28]. A possible list of eligible projects in this area is likely to include development of: (i) national and regional disaster insurance programmes for businesses and individuals; (ii) regional weather derivatives markets for businesses[29]; (iii) country-level disaster risk fiscal hedging programmes; and (iv) national institutional capacity building in disaster risk management and risk transfer.

Component C: Strengthening of weather forecasting and flood early warning systems. Component C would finance the development and strengthening of meteorological and hydrological monitoring and forecasting systems, both at country and regional levels. The support would be provided to increase data-gathering capacity and data quality, and to enhance data-sharing between the countries of the SEE region. It would also finance design, feasibility studies, and installation of flood early warning systems, as well as regional workshops to allow for knowledge

[28] Such programmes would follow the previous World Bank models of disaster insurance operations both at the country and regional level, e.g. the Turkish Catastrophe Insurance Programme in Turkey and the Caribbean Catastrophe Insurance Facility in the Caribbean, as well as a weather derivatives risk market project in India.

[29] Development of financial weather risk hedging instruments will be accomplished through the creation of a regional and possibly, at a later stage, a pan-European weather risk market, which implies development of tradable indexes of temperature and precipitation that can be used by businesses to hedge against weather extremes.

dissemination and sharing and to encourage further cooperation between national meteorological and hydrological services of relevant countries.

Component D: Disaster preparedness and response. This component would support a range of activities which enhance disaster preparedness in the countries of the SEE region to respond to a range of disasters caused by the impact of natural hazards such as earthquakes, floods, forest fires, industrial accidents and droughts. Within the realm of this component, support would be extended to: (i) emergency response equipment for public safety units such fire trucks, ambulances, search and rescue equipment, and fire fighting planes; (ii) emergency response planning and exercises at local, national and regional levels; (iii) emergency communication systems and information management systems for collecting, analyzing and sharing real-time data between emergency response units and other public authorities; (iv) 112 emergency call systems; and (v) public awareness and education.

Component E: Contingency facility (differed drawdown option). The contingency facility could provide pre-approved funding that could be swiftly withdrawn in the case of a disaster to address a country's immediate liquidity needs. The contingency funding could also be used to back the national or regional disaster risk financing programmes. Thus, this instrument would protect country resources allocated to other development programmes.

Phase II: Structural investments

This phase would support structural investments aimed at protecting assets, lives and the livelihoods of communities in disaster-prone areas. It would also provide funding for adaptation to climate change and streamlining adaptation activities into SEE countries' development programmes. The prioritization of the investments would be carried out during Phase I of SEEDRMAP, through the process of development of national disaster risk management and adaptation strategies. The national strategy would constitute a basis for investment decisions and a trigger for Phase II, which would include the following components:

Component A: Structural investments in disaster risk reduction. This component would provide funding for investments aimed at reducing country vulnerability to hazards, including: (i) flood protection; (ii) dam safety; (iii) retrofitting of priority buildings, such as schools and hospitals, to withstand earthquakes and severe storms; and (iv) retrofitting of infrastructure such as road networks, power grids and water supply. Because of the significant investments involved, careful prioritization would be carried out at the country level, taking into account the disaster risks, affected population and costs. The prioritization process would be conducted as part of the development of the country disaster risk reduction and adaptation strategy.

Component B: Sectoral adaptation investments. This component would finance sector-specific adaptation investments aimed at streamlining adaptation into government development programmes. The priority investments would vary from country to country, but could include a range of activities, such as: (i) water-saving investments; (ii) investments in innovative energy technologies and improvement of energy grids; (iii) changes in crop patterns and introduction of drought resistant crops; and (iv) improvement of forest management to reduce the risk of forest fires.

Component C: Contingency facility (differed drawdown option). As in Phase I, the contingency facility would provide pre-approved funding that could be withdrawn quickly in case of a disaster and upon meeting predefined triggers. This pre-approved funding could be withdrawn by the SEE Governments to address their countries' immediate liquidity needs in the aftermath of a disaster, and to provide financial support for disaster financing schemes

Annex - Terminology[30]
Basic Terms of Disaster Risk Reduction

Acceptable risk
The level of loss a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions.

In engineering terms, acceptable risk is also used to assess structural and non-structural measures undertaken to reduce possible damage at a level which does not harm people and property, according to codes or "accepted practice" based, among other issues, on a known probability of hazard.

Biological hazard
Processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Examples of biological hazards: outbreaks of epidemic diseases, plant or animal contagion, insect plagues and extensive infestations.

Building codes
Ordinances and regulations controlling the design, construction, materials, alteration and occupancy of any structure to insure human safety and welfare. Building codes include both technical and functional standards.

Capacity
A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster.

Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability.

Capacity building
Efforts aimed to develop human skills or societal infrastructures within a community or organization needed to reduce the level of risk.

In extended understanding, capacity building also includes development of institutional, financial, political and other resources, such as technology at different levels and sectors of the society.

[30] The ISDR Secretariat presents these basic definitions on disaster risk reduction in order to promote a common understanding on this subject, for use by the public, authorities and practitioners. The terms are based on a broad consideration of different international sources. This is a continuing effort to be reflected in future reviews, responding to a need expressed in several international venues, regional discussions and national commentary. See:http://www.unisdr.org/terminology.

Climate change

The climate of a place or region is changed if over an extended period (typically decades or longer) there is a statistically significant change in measurements of either the mean state or variability of the climate for that place or region.

Changes in climate may be due to natural processes or to persistent anthropogenic changes in atmosphere or in land use. Note that the definition of climate change used in the United Nations Framework Convention on Climate Change is more restricted, as it includes only those changes which are attributable directly or indirectly to human activity.

Coping capacity

The means by which people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster.

In general, this involves managing resources, both in normal times as well as during crises or adverse conditions. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and human-induced hazards.

Counter measures

All measures taken to counter and reduce disaster risk. They most commonly refer to engineering (structural) measures but can also include non-structural measures and tools designed and employed to avoid or limit the adverse impact of natural hazards and related environmental and technological disasters.

Disaster

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.

A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

Disaster risk management

The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

Disaster risk reduction (disaster reduction)

The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

The disaster risk reduction framework is composed of the following fields of action, as described in ISDR's publication 2002 "Living with Risk: a global review of disaster reduction initiatives", page 23:

- Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis;
- Knowledge development including education, training, research and information;
- Public commitment and institutional frameworks, including organisational, policy, legislation and community action;
- Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments;
- Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities.

Early warning

The provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response.

Early warning systems include a chain of concerns, namely: understanding and mapping the hazard; monitoring and forecasting impending events; processing and disseminating understandable warnings to political authorities and the population, and undertaking appropriate and timely actions in response to the warnings.

Ecosystem

A complex set of relationships of living organisms functioning as a unit and interacting with their physical environment.

The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus the extent of an ecosystem may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2001).

El Niño-southern oscillation (ENSO)

A complex interaction of the tropical Pacific Ocean and the global atmosphere that results in irregularly occurring episodes of changed ocean and weather patterns in many parts of the world, often with significant impacts, such as altered marine habitats, rainfall changes, floods, droughts, and changes in storm patterns.

The El Niño part of ENSO refers to the well-above-average ocean temperatures along the coasts of Ecuador, Peru and northern Chile and across the eastern equatorial Pacific Ocean, while the Southern Oscillation refers to the associated global patterns of changed atmospheric pressure and rainfall. La Niña is approximately the opposite condition to El Niño. Each El Niño or La Niña episode usually lasts for several seasons.

Emergency management

The organization and management of resources and responsibilities for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation.

Emergency management involves plans, structures and arrangements established to engage the normal endeavours of government, voluntary and private agencies in a comprehensive and coordinated way to respond to the whole spectrum of emergency needs. This is also known as disaster management.

Environmental impact assessment (EIA)

Studies undertaken in order to assess the effect on a specified environment of the introduction of any new factor, which may upset the current ecological balance.

EIA is a policy making tool that serves to provide evidence and analysis of environmental impacts of activities from conception to decision-making. It is utilised extensively in national programming and for international development assistance projects. An EIA must include a detailed risk assessment and provide alternatives solutions or options.

Environmental degradation

The reduction of the capacity of the environment to meet social and ecological objectives, and needs.
Potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards.

Some examples: land degradation, deforestation, desertification, wildland fires, loss of biodiversity, land, water and air pollution, climate change, sea level rise and ozone depletion.

Forecast

Definite statement or statistical estimate of the occurrence of a future event (UNESCO, WMO).
This term is used with different meanings in different disciplines.

Geological hazard

Natural earth processes or phenomena that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Geological hazard includes internal earth processes or tectonic origin, such as earthquakes, geological fault activity, tsunamis, volcanic activity and emissions as well as external processes such as mass movements: landslides, rockslides, rock falls or avalanches, surfaces collapses, expansive soils and debris or mud flows.
Geological hazards can be single, sequential or combined in their origin and effects.

Geographic information systems (GIS)

Analysis that combine relational databases with spatial interpretation and outputs often in form of maps. A more elaborate definition is that of computer programmes for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced.

Geographical information systems are increasingly being utilised for hazard and vulnerability mapping and analysis, as well as for the application of disaster risk management measures.

Greenhouse gas (GHG)

A gas, such as water vapour, carbon dioxide, methane, chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), that absorbs and re-emits infrared radiation, warming the earth's surface and contributing to climate change (UNEP, 1998).

Hazard

A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.
Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency and probability.

Hazard analysis

Identification, studies and monitoring of any hazard to determine its potential, origin, characteristics and behaviour.

Hydrometeorological hazards

Natural processes or phenomena of atmospheric, hydrological or oceanographic nature, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.
Hydrometeorological hazards include: floods, debris and mud floods; tropical cyclones, storm surges, thunder/hailstorms, rain and wind storms, blizzards and other severe storms; drought, desertification, wildland fires, temperature extremes, sand or dust storms; permafrost and snow or ice avalanches. Hydrometeorological hazards can be single, sequential or combined in their origin and effects.

La Niña

(see El Niño-Southern Oscillation).

Land-use planning

Branch of physical and socio-economic planning that determines the means and assesses the values or limitations of various options in which land is to be utilized, with the corresponding effects on different segments of the population or interests of a community taken into account in resulting decisions.

Land-use planning involves studies and mapping, analysis of environmental and hazard data, formulation of alternative land-use decisions and design of a long-range plan for different geographical and administrative scales. Land-use planning can help to mitigate disasters and reduce risks by discouraging high-density settlements and construction of key installations in hazard-prone areas, control of population density and expansion, and in the siting of service routes for transport, power, water, sewage and other critical facilities.

Mitigation
Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Natural hazards
Natural processes or phenomena occurring in the biosphere that may constitute a damaging event.

Natural hazards can be classified by origin namely: geological, hydrometeorological or biological. Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing.

Preparedness
Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.

Prevention
Activities to provide outright avoidance of the adverse impact of hazards and means to minimize related environmental, technological and biological disasters.

Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disasters. In the context of public awareness and education, related to disaster risk reduction changing attitudes and behaviour contribute to promoting a "culture of prevention".

Public awareness
The processes of informing the general population, increasing levels of consciousness about risks and how people can act to reduce their exposure to hazards. This is particularly important for public officials in fulfilling their responsibilities to save lives and property in the event of a disaster.

Public awareness activities foster changes in behaviour leading towards a culture of risk reduction. This involves public information, dissemination, education, radio or television broadcasts, use of printed media, as well as, the establishment of information centres and networks and community and participation actions.

Public information
Information, facts and knowledge provided or learned as a result of research or study, available to be disseminated to the public.

Recovery
Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.

Recovery (rehabilitation and reconstruction) affords an opportunity to develop and apply disaster risk reduction measures.

Relief / response

The provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.

Resilience / resilient

The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.

Retrofitting

(or upgrading)
Reinforcement of structures to become more resistant and resilient to the forces of natural hazards. Retrofitting involves consideration of changes in the mass, stiffness, damping, load path and ductility of materials, as well as radical changes such as the introduction of energy absorbing dampers and base isolation systems. Examples of retrofitting includes the consideration of wind loading to strengthen and minimize the wind force, or in earthquake prone areas, the strengthening of structures.

Risk

The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.

Conventionally risk is expressed by the notation Risk = Hazards x Vulnerability. Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.
Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.

Risk assessment/analysis

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

The process of conducting a risk assessment is based on a review of both the technical features of hazards such as their location, intensity, frequency and probability; and also the analysis of the physical, social, economic and environmental dimensions of vulnerability and exposure, while taking particular account of the coping capabilities pertinent to the risk scenarios.

Structural / non-structural measures

Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure.

Non-structural measures refer to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk and related impacts.

Sustainable development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and the future needs. (Brundtland Commission, 1987).
Sustainable development is based on socio-cultural development, political stability and decorum, economic growth and ecosystem protection, which all relate to disaster risk reduction.

Technological hazards

Danger originating from technological or industrial accidents, dangerous procedures, infrastructure failures or certain human activities, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.
Some examples: industrial pollution, nuclear activities and radioactivity, toxic wastes, dam failures; transport, industrial or technological accidents (explosions, fires, spills).

Vulnerability

The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.
For positive factors, which increase the ability of people to cope with hazards, see definition of capacity.

Wildland fire

Any fire occurring in vegetation areas regardless of ignition sources, damages or benefits.

References

Benson, C. and Twig, J. (2004). Measuring Mitigation: Methodologies for Assessing Natural Hazard Risks and the Net Benefits of Mitigation - A Scoping Study. Geneva, Switzerland: IFRC/the ProVention Consortium.

DESA, ISDR and USA NOAA (2004). Guidelines for Reducing Flood Losses. United Nations.

Dilley, M., et al. (2005). Natural Disaster Hotspots: A Global Risk Analysis. World Bank.

Emergency Events Data Base (EM-DAT), a global disaster data-base maintained by the Centre for Research on the Epidemiology and Disasters (CRED) in Brussels.

European Commission (2007). Green Paper from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: Adapting to Climate Change in Europe - Options for EU Action. 29 June 2007.

European Environment Agency (2005). Vulnerability and Adaptation to Climate Change in Europe. EEA Technical Report No. 7/2005. Copenhagen, Denmark.

Gurenko, E., et al. (2008). Mitigating the Adverse Financial Effects of Natural Hazards on the Economies of South Eastern Europe: A Study of Disaster Risk Financing Options. Geneva, Switzerland: UN/ISDR-World Bank.

Gurenko, E., et al. (2006). Earthquake Insurance in Turkey: History of the Turkish Catastrophe Insurance Pool. World Bank.

Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters: http://www.unisdr.org/hfa

IPCC (2007). Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change; M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge, UK: Cambridge University Press.

ISDR Terminology: Basic Terms of Disaster Risk Reduction: http://www.unisdr.org/terminology

Kryspin-Watson, J. et al. (2006). Mainstreaming Hazard Risk Management into Rural Projects. Disaster risk management working paper series, no. 13. World Bank.

National Hydrologic Warning Council (2002). Use and Benefits of the National Weather Service River and Flood Forecasts.

Ogonesyan (2006). Presented in "Weather/Climate Services in ECA: A Regional Review"; World Bank, 2008.

Parker, R. (2006). Hazards of Nature, Risks to Development - An IEG Evaluation of World Bank Assistance for Natural Disasters. Independent Evaluation Group (IEG), World Bank.

Pusch, C. (2004). Preventable Losses: Saving Lives and Property through Hazard Risk Management - A Comprehensive Risk Management Framework for Europe and Central Asia. Disaster risk management working paper series, no. 9. World Bank.

UN/ISDR - WB (2008). South Eastern Europe Disaster Risk Mitigation and Adaptation Initiative: Risk Assessment in South Eastern Europe - A Desk Study Review. Geneva, Switzerland: United Nations.

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