WORLD BANK GROUP | GFDRR

EUROPE AND CENTRAL ASIA (ECA)
RISK PROFILES

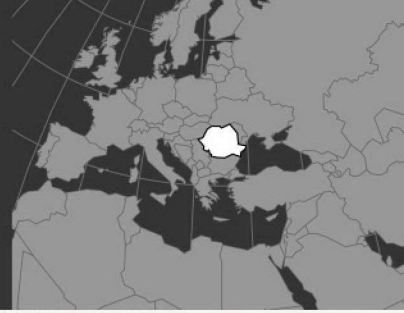
Romania

GDP $185 billion*

Population 19.5 million*

AFFECTED BY 100-YEAR FLOOD	AFFECTED BY 250-YEAR EARTHQUAKE	CAPITAL LOSS FROM 250-YEAR EARTHQUAKE
$10 billion (7%)	$100 billion (65%)	$20 billion (11%)
2 million (8%)	10 million (59%)	5,000 (<1%)

*2015 estimates



Romania's population and economy are exposed to earthquakes and floods, with earthquakes posing the greater risk of a high impact, lower probability event. The model results for present-day risk shown in this risk profile are based on population and gross domestic product (GDP) estimates for 2015. The estimated damage caused by historical events is inflated to 2015 US dollars.

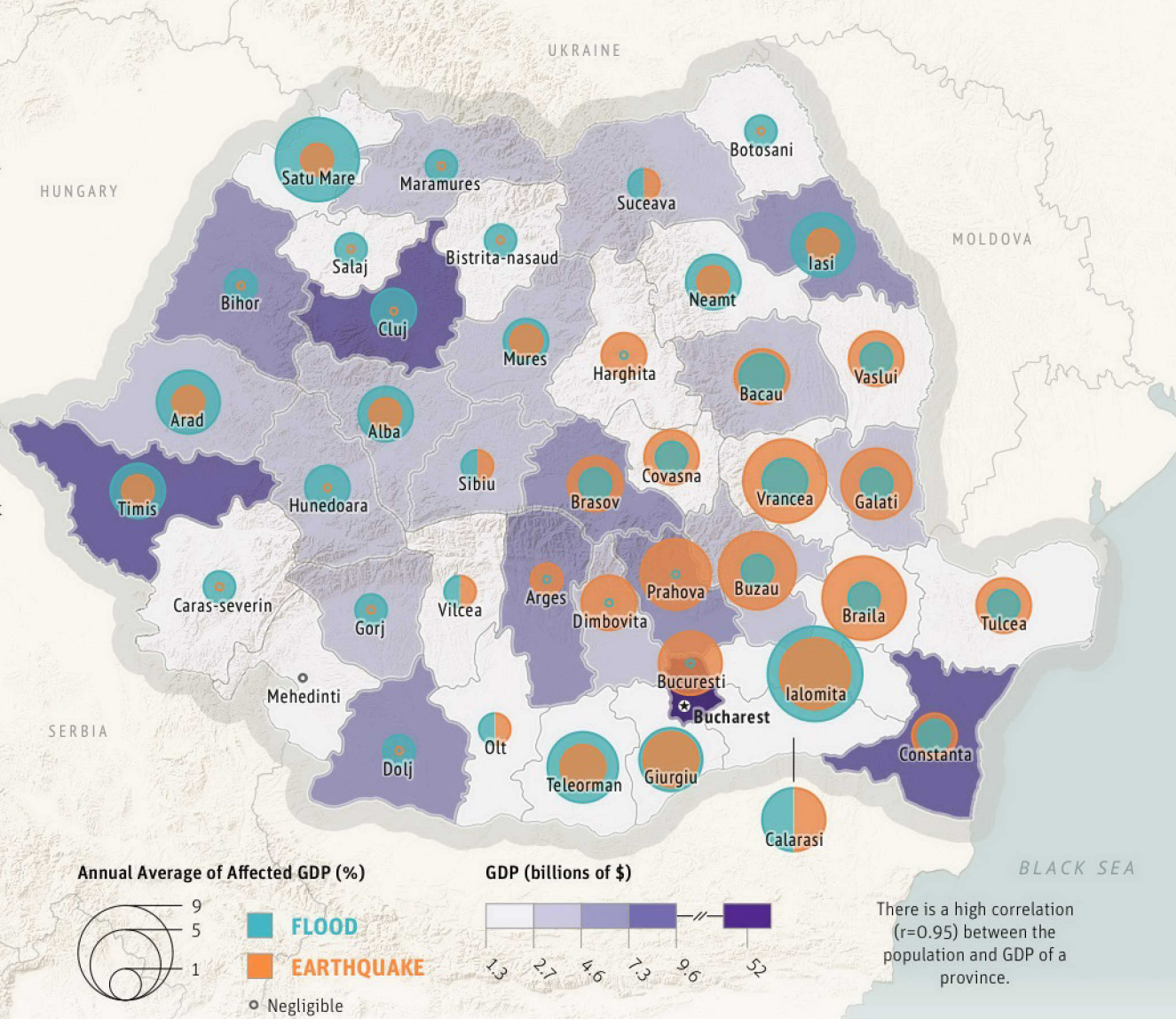
Just over half of Romania's population lives in urban environments. The country's GDP was approximately US$185 billion in 2015, with over 50 percent derived from services, most of the remainder generated by industry, and agriculture making a small contribution. Romania's per capita GDP was $9,490.

This map displays GDP by province in Romania, with greater color saturation indicating greater GDP within a province. The blue circles indicate the risk of experiencing floods and the orange circles the risk of earthquakes in terms of normalized annual average of affected GDP. The largest circles represent the greatest normalized risk. The risk is estimated using flood and earthquake risk models.

The table displays the provinces at greatest normalized risk for each peril. In relative terms, as shown in the table, the province at greatest risk of floods is Ialomita, and the one at greatest risk of earthquakes is Braila. In absolute terms, the province at greatest risk of floods is Timis, and the one at greatest risk of earthquakes is Bucuresti.

TOP AFFECTED PROVINCES

FLOOD: ANNUAL AVERAGE OF AFFECTED GDP (%)		EARTHQUAKE: ANNUAL AVERAGE OF AFFECTED GDP (%)	
Ialomita	9	Braila	7
Satu Mare	7	Vrancea	7
Teleorman	5	Buzau	6
Iasi	4	Galati	6
Arad	4	Prahova	5
Giurgiu	4	Ialomita	5
Calarasi	4	Calarasi	4
Alba	3	Bucuresti	4
Timis	3	Giurgiu	3
Neamt	3	Bacau	3



There is a high correlation (r=0.95) between the population and GDP of a province.

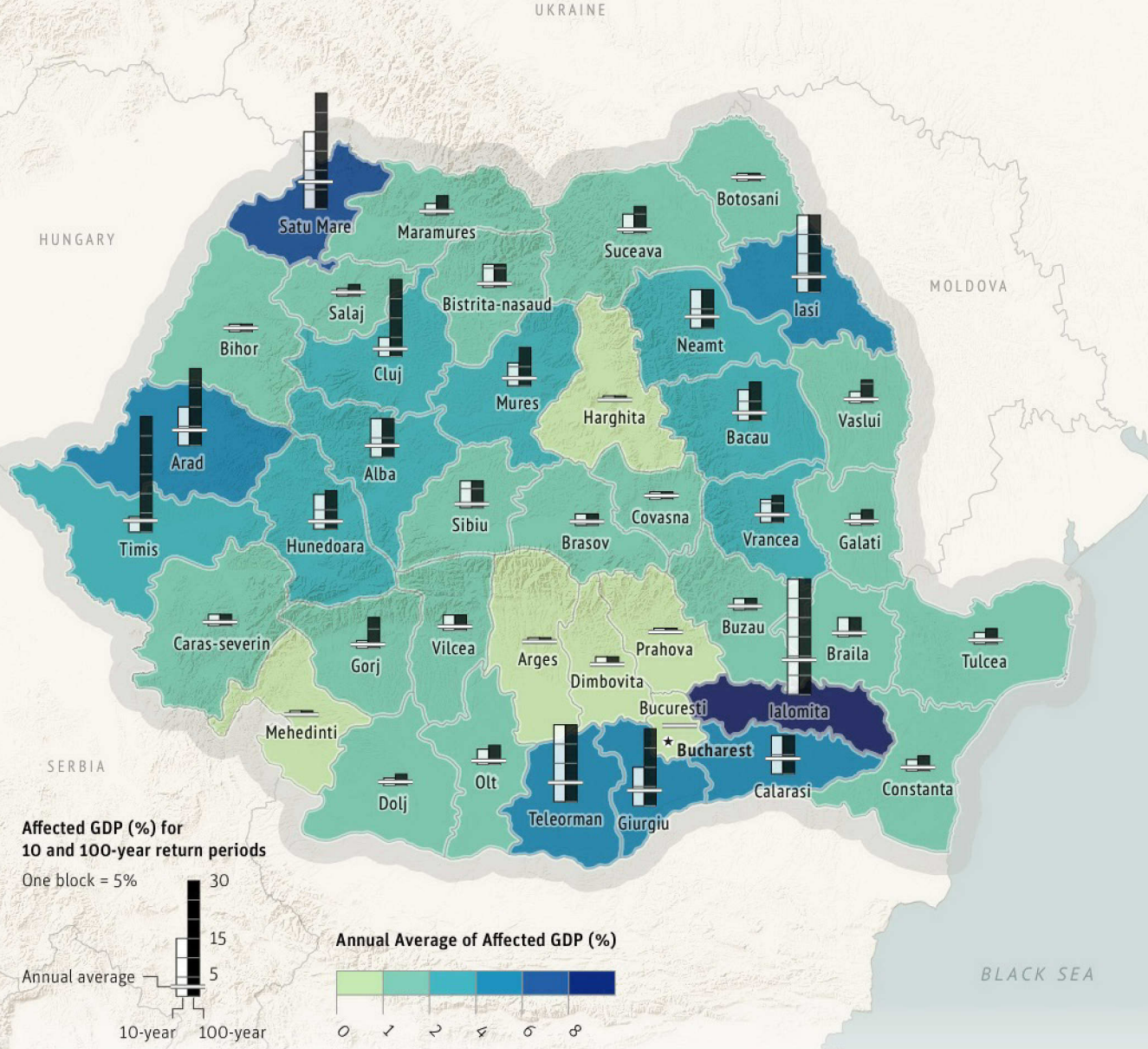
Romania's most deadly flood since 1900 occurred in 1926 and caused about 1,000 fatalities. More recently, flooding in 1970 caused over 200 fatalities and at least $3 billion in damage. Floods in 1975 caused approximately 60 fatalities. Three floods in 2005 caused close to 60 deaths and almost $2 billion in damage. Further flooding in 2010 caused no fatalities but over $1 billion in damage. These statistics highlight the lives saved by disaster risk management efforts, but also the possibility that the damage associated with flooding will rise.

This map depicts the impact of flooding on provinces' GDPs, represented as percentages of their annual average GDPs affected, with greater color saturation indicating higher percentages. The bar graphs represent GDP affected by floods with return periods of 10 years (white) and 100 years (black). The horizontal line across the bars also shows the annual average of GDP affected by floods.

When a flood has a 10-year return period, it means the probability of occurrence of a flood of that magnitude or greater is 10 percent per year. A 100-year flood has a probability of occurrence of 1 percent per year. This means that over a long period of time, a flood of that magnitude will, on average, occur once every 100 years. It does not mean a 100-year flood will occur exactly once every 100 years. In fact, it is possible for a flood of any return period to occur more than once in the same year, or to appear in consecutive years, or not to happen at all over a long period of time.

If the 10- and 100-year bars are the same height, then the impact of a 10-year event is as large as that of a 100-year event, and the annual average of affected GDP is dominated by events that happen relatively frequently. If the impact of a 100-year event is much greater than that of a 10-year event, then less frequent events make a larger contribution to the annual average of affected GDP. Thus, even if a province's annual affected GDP seems small, less frequent and more intense events can still have large impacts.

The annual average population affected by flooding in Romania is about 300,000 and the annual average affected GDP about $2 billion. Since within the various provinces the impacts from 10- and 100-year floods do not differ much, relatively frequent floods have large impacts on these averages.



Romania's worst earthquake since 1900 took place in 1977 in Vrancea, with a magnitude of 7.2. It caused more than 1,500 fatalities and close to $8 billion in damage. Other major earthquakes affecting Romania occurred in 1802, 1838, 1940, 1986, and 1990. The 1802 event, also centered in Vrancea, was one of the largest earthquakes on record to occur in Europe, and the largest to strike Romania.

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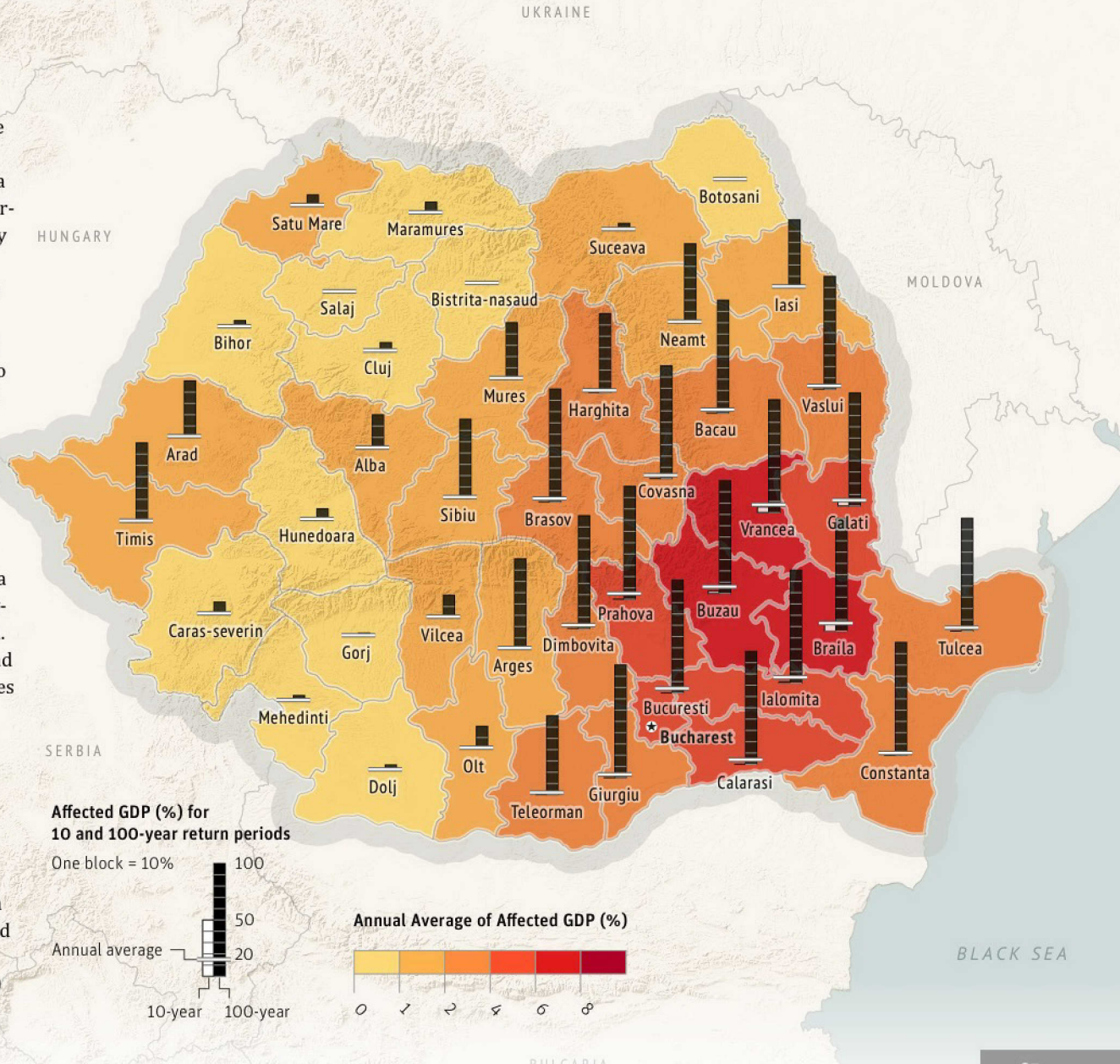
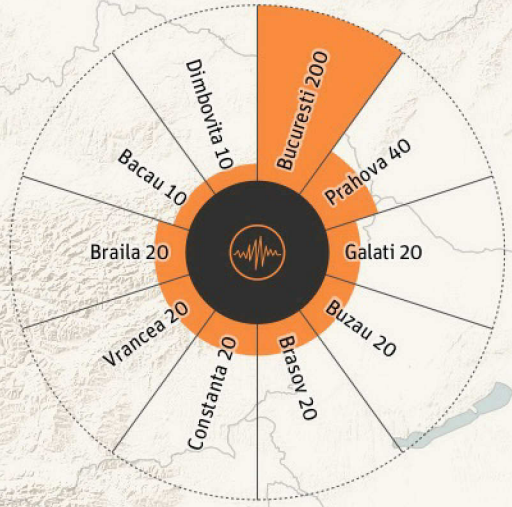
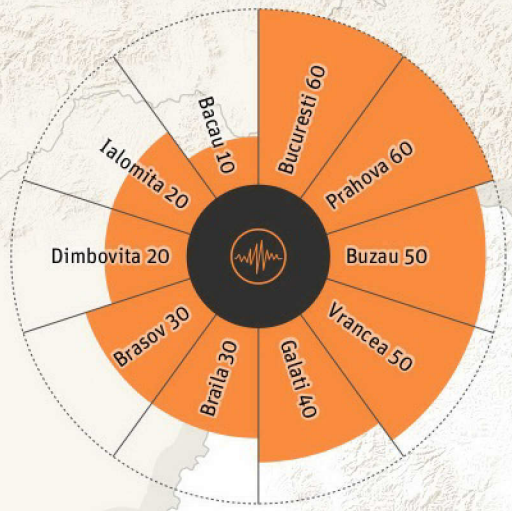
The annual average population affected by earthquakes in Romania is about 400,000 and the annual average affected GDP about $5 billion. The annual averages of fatalities and capital losses caused by earthquakes are about 400 and about $500 million, respectively. The fatalities and capital losses caused by more intense, less frequent events can be substantially larger than the annual averages. For example, an earthquake with a 0.4 percent annual probability of occurrence (a 250-year return period event) could cause about 5,000 fatalities and $20 billion in capital loss (about 10 percent of GDP).



EARTHQUAKE
ANNUAL AVERAGE CAPITAL LOSS (MILLIONS $)

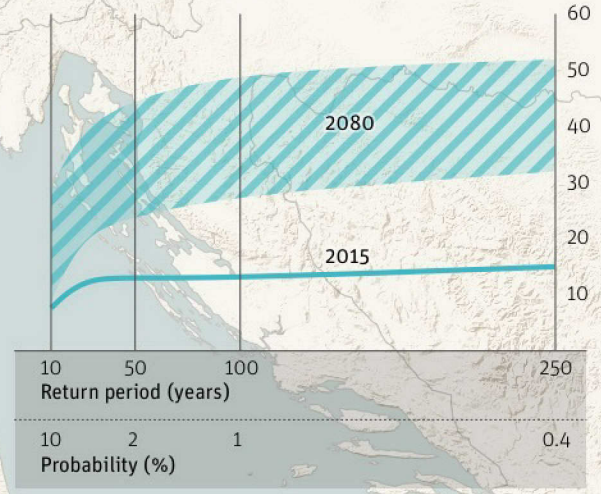


EARTHQUAKE
ANNUAL AVERAGE FATALITIES

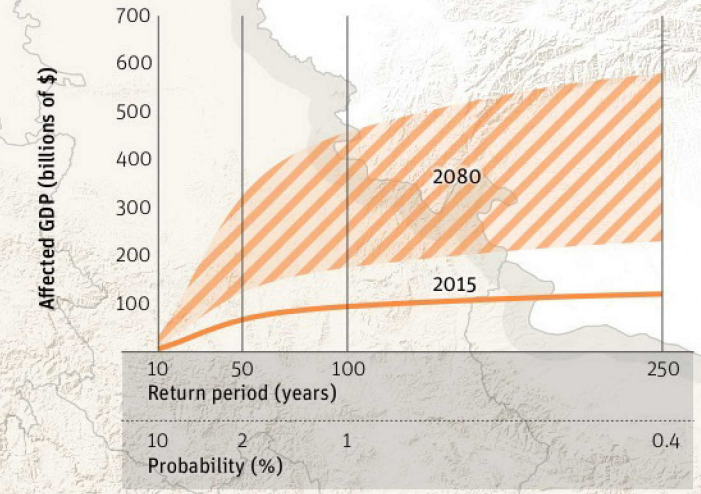


The rose diagrams show the provinces with the potential for greatest annual average capital losses and highest annual average numbers of fatalities, as determined using an earthquake risk model. The potential for greatest capital loss occurs in Bucuresti, which is not surprising, given the economic importance of the province.

FLOOD
EXCEEDANCE PROBABILITY CURVE, 2015 AND 2080



EARTHQUAKE
EXCEEDANCE PROBABILITY CURVE, 2015 AND 2080



The exceedance probability curves display the GDP affected by, respectively, floods and earthquakes for varying probabilities of occurrence. Values for two different time periods are shown. A solid line depicts the affected GDP for 2015 conditions. A diagonally striped band depicts the range of affected GDP based on a selection of climate and socioeconomic scenarios for 2080. For example, if Romania had experienced a 100-year return period flood event in 2015, the affected GDP would have been an estimated $10 billion. In 2080, however, the affected GDP from the same type of event would range from about $30 billion to about $50 billion. If Romania had experienced a 250-year earthquake event in 2015, the affected GDP would have been about $100 billion. In 2080, the affected GDP from the same type of event would range from about $200 billion to about $600 billion, due to population growth, urbanization, and the increase in exposed assets.

All historical data on floods and earthquakes are from, respectively, D. Guha-Sapir, R. Below, and Ph. Hoyois, EM-DAT: International Disaster Database (Université Catholique de Louvain, Brussels, Belgium), www.emdat.be, and J. Daniell and A. Schaefer, "Eastern Europe and Central Asia Region Earthquake Risk Assessment Country and Province Profiling," final report to GFDRR, 2014. Damage estimates for all historical events have been inflated to 2015 US$.