Strong increase global river flood risk may trigger large-scale crises

May 2nd, 2017

Photo: Flooding of Bangkok (Thailand) 2011 (U.S. Pacific Fleet, www.flickr.com)

Even under the most optimistic scenario of ½nlyI 1.5°C global warming, a more than doubling of global river ⅇood risk was estimated compared to 1976-2005 in a recent study. This implies that e◍ective adaptation plans must be implemented timely to control river ⅇood risk.

Global river flood risk strongly increases

Globally, almost 1 billion people live in ⅇoodplains. Global warming will intensify the hydrological cycle of the planet, leading to more extreme rainfall accumulation and a widespread increase in river ⅇood risk in all continents. Under a high-end scenario of climate change, global river ⅇood impacts are projected to rise at an average rate of 2.4 million people and 3 billion EUR per year, exceeding a fourfold increase in ⅇood risk by the end of the century due to climate change only.

This is one of the 𝟙ndings of a study on ⅇood risk in large river basins across the world for three speci𝟙c warming levels: 1.5°C, 2°C, and 4°C compared to preindustrial levels. The two

lower levels refer to the Paris Agreement where it was agreed to join e□orts in keeping the increase in global average temperature to well below 2°C above preindustrial levels and to pursue e□orts to limit the temperature increase to 1.5°C. In this study projections from seven climate models were used to estimate changes in the expected damage and population a□ected by river □oods under these three warming levels. The study focused on climate change e□ects only: e□ects of socioeconomic changes (population, GDP, land use) were not included.

The study takes the impact over the baseline period 1976-2005 as a reference. Central estimates of global □ood risk in this baseline period total 54 million people a□ected and 58 billion EUR (75 billion USD) of damage per year. The □ndings of this study indicate that, compared with 1976-2005, the expected damage and population a□ected by river □oods increase by 120% and 100% in the study area, respectively, when global warming rises by 1.5°C compared to preindustrial levels. For 2°C global warming expected damage and population a□ected by river □oods are estimated to increase by 170%, and for 4°C global warming by about 500%.

Largest increase for U.S., Asia and Europe

Largest increase in □ood risk was found for the U.S., Asia, and Europe. Largest absolute impacts were found in China, where current estimates of 9 million people a□ected and 25 billion EUR damage per year are projected to rise with global warming, reaching 40 million and 110 billion EUR per year at 4°C warming. A strong (more than 20-fold) increase in □ood risk was also found for India and Bangladesh at 4°C warming, which puts them in the top of countries with most people a□ected. Remarkably, projected increase in □ood risk is relatively high for the European Union as a whole as well, in spite of the relatively high standards of □ood protection in the EU countries.

Potentially triggering large-scale climatic crises

According to the authors these results imply that e□ective adaptation plans must be implemented timely to complement mitigation e□orts in order to control □ood risk. In fact, socioeconomic drivers are likely to make impacts even higher in developing countries and in regions with signi□cant population growth. The increase in □ood risk, the authors conclude, may become unsustainable in regions where the combination of socioeconomic and climatic drivers is particularly adverse, potentially triggering large-scale climatic crises involving con□icts and mass migration.

Source: Al□eri et al., 2017. EarthIs Future 5: 171-182.