

Science for Environment Policy

A global risk assessment of river and coastal flooding

A new study provides the first global estimates of river and coastal flooding, highlighting past and future trends, and indicates that Asia and Europe are two of the regions that are worst affected. The researchers suggest that their methods could be useful in developing a global framework for flood risk assessment.

Although millions of people worldwide are affected by floods every year, knowledge about flood risk is mostly limited to small-scale studies. The researchers assessed the global exposure to river and coastal flooding using two methods. First, they estimated the proportion of the population exposed to river flooding and coastal flooding. Secondly, they estimated the urban area exposed to river flooding and coastal flooding. For both methods, they used data from 1970-2010 and carried out simulations to predict future effects of flooding until 2050. They also calculated the cost of damage based on the results from each method. For the future projections only socioeconomic changes were taken into account, assuming no climate change.

Both methods suggested that the potential effects of flooding increased between 1970 and 2010. The population method indicated that around three quarters of those who were affected by river flooding in 2010 lived in Asia. Only 9% lived in Europe, although, behind Asia, more people were exposed to river flooding in Europe than anywhere else. The population exposed to river flooding in Europe was predicted to fall between now and 2050.

However, using the urban area method, the effects of river flooding in 2010 were more evenly distributed across the regions, with less than half of flood prone urban areas in Asia and 17% in Europe. The results for coastal flooding were similar, with the urban area method again suggesting that Europe was exposed to higher levels of flooding than the population method.

The total potential loss from river flooding in 2010 was estimated at either US \$35 trillion (€26.88 trillion) based on the population method, or \$21 trillion (€16.13 trillion) based on the urban area method. This is an increase by a factor of around 4 or 18, respectively, since 1970. The potential economic impact of coastal flooding was lower in 2010, but still \$13 trillion (€9.97 trillion) or \$8 trillion (€6.14 trillion), with similar increases to river flooding since 1970.

Using the population method, the largest economic exposure was on Asia, whereas using the urban area method, potential economic flood losses were higher in Europe and the United States. Both methods predicted that the economic impact of flooding would increase in the coming decades, with the largest impacts on Sub-Saharan Africa.

According to the researchers, both methods have limitations including some of the assumptions that had to be made in order to produce estimates of flood damage. For instance, the urban area method assumed all urban areas in the same country had the same economic value, which is not the case in reality.

They suggest that it is difficult to reach any conclusion about which of the two methods is more accurate, although the population method might be a better option for assessing global as opposed to small-scale effects. By combining their methodologies with more data on flood protection standards globally, the researchers hope to aid the development of a global framework for flood risk assessment.



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