

ECONOMIC IMPACTS

Global flood risk

Glob. Environ. Change. <http://doi.org/h5b> (2012)



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Increased climate-related flood events and population and wealth growth in areas prone to flooding call for global flood-risk assessments. However, lack of global data and appropriate methods has hampered research.

Brenden Jongman of the Institute for Environmental Studies, VU University Amsterdam, The Netherlands, and co-workers estimated for the first time the global economic exposure to both river and coastal flooding for the period 1970–2050. They assessed damage first on the basis of population density and then on the basis of land use. In the first case, they estimated a total global exposure of US\$46 trillion in 2010, which they projected to increase to US\$158 trillion in 2050. In the second case, they estimated a total global exposure of US\$27 trillion in 2010, projected to increase to US\$80 trillion in 2050.

For most regions of the world, growth of population and assets in flood-prone areas is found to be higher than overall growth, with the trend particularly strong in sub-Saharan Africa and South-East Asia. *MC*

EMISSIONS ACCOUNTING

International freight impact

J. Environ. Econ. Manag. <http://doi.org/h5j> (2012)

Greenhouse-gas emissions from international trade come not only from producing the goods exchanged, but also from transporting them between countries. Largely overlooked, international transport emissions may change the ranking of countries by emissions per dollar of trade.

David Hummels of the University of Oregon, USA, and colleagues collected data on worldwide trade by transport mode — maritime, land and air — to estimate the amount of greenhouse-gas emissions associated with production and international transportation of traded goods from 23 sectors in 2004. They find that international transport is responsible for 33% of worldwide trade-related emissions, and over 75% of emissions for major manufacturing categories. They also discuss whether considering transport emissions increases the overall level of emissions from trade and illustrate how importing goods from low-emission producers can decrease a country's emissions, in the case of efficient transport.

Finally, they show that with full liberalization of tariffs and growth in gross domestic product concentrated in China and India, transport emissions grow much faster than the value of trade, due to trade shifting toward distant trading partners. *MC*

MITIGATION

Climate implications of CCS

Environ. Sci. Technol. <http://doi.org/h5k> (2012)

Given the ongoing reliance on coal as an energy source for electricity production,

carbon capture and storage (CCS) technology — which separates CO₂ and other gases so that they can be stored preventing their emission into the atmosphere — seems to be an important part of the route to low-carbon electricity generation, at least in principle.

To investigate whether this may be true in practice, Roger Sathre and Eric Masanet from the Lawrence Berkley National Laboratory, California, USA, investigated the long-term energy and climate implications of different implementation strategies for CCS in the US coal-fired electricity fleet of power stations.

Assuming continued large-scale use of coal for electricity generation, they find that rapid implementation of CCS technology could reduce cumulative greenhouse-gas emissions (CO₂, CH₄ and N₂O) from US coal-fired power stations between 37 and 58% by 2100. But that cumulative radiative forcing would be reduced by only 24–46%, due to the front-loaded time profile of the emissions and the long atmospheric residence time of CO₂. The study demonstrates the time-dynamic nature of the potential climate benefits and energy costs of different CCS deployment pathways, highlighting opportunities and constraints to successful CCS implementation. *AB*

CRYOSCIENCE

Loss captured

Science **337**, 569–573 (2012)

Global warming is predicted to affect the Greenland Ice Sheet and lead to sea-level rise. Ice loss can be a result of surface melting exceeding snow accumulation (surface mass balance) or loss from the marine end, by iceberg calving causing accelerated movement, leading to thinning of the ice-sheet (dynamic loss). There were limited observations of ice-sheets available prior to this century, from which to track ice-sheet changes and their causes. Kurt Kjær, of the University of Copenhagen, Denmark, and co-workers used aerial photographs to produce digital elevation models for northwestern Greenland back to 1985. The models allowed analysis of thinning of the ice sheet. The results show two independent dynamic loss events during 1985–2010. These events seem to be the primary cause of ice-mass changes, rather than melting events. Future ice-sheet responses to climate change, and associated sea-level rise, will be difficult to predict until the cause of the dynamic loss events is resolved. *BW*

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HUMAN HEALTH

Dengue fever transmission

Environ. Res. Lett. <http://doi.org/h5m> (2012)

Predicted shifts in temperature and precipitation patterns as the global climate warms have the potential to profoundly impact the transmission and incidence of certain infectious diseases. In particular, a widening of the tropical climatic belt has been suggested to facilitate the expansion of tropical and subtropical diseases.

One of the most important diseases in terms of human health is dengue fever; a resurging mosquito-vectored disease affecting some 40% of the world's population. Richard Erickson from the Institute of Environmental and Human Health, Texas Tech University, USA and co-authors, modelled changes in dengue season length by the end of the twenty-first century — based on the ecological response of the Asian tiger mosquito (*Aedes albopictus*) for three cities, Atlanta, Chicago and Lubbock, chosen because they are located on the edges of the range of the mosquito in the US.

They found that projected warming both increased mosquito range northwards and shortened mosquito lifespans in the south, limiting the incubation of the disease at the southern end of the range. The findings illustrate that climatic change may impair as well as enhance disease transmission. *AB*