# Headlines from the IPCC Special Report on Extreme Events

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**Introduction**

On November 18th 2011, the Intergovernmental Panel on Climate Change (IPCC) launched its 'Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation' (SREX). The findings were approved by 194 governments following a four-day meeting in Kampala, Uganda in which the Report's Summary for Policy Makers was agreed line by line. Written over two and a half years by over 200 authors, reviewed by many hundreds more and involving academics, practitioners and policy makers from Fiji to Senegal and from Russia to Chile, the report presents a dramatic and precise set of findings. Launched against a backdrop of famine in Somalia, unseasonably heavy snowfall in the US, floods in Thailand and a national drought emergency in Tuvalu; the report includes clear but typically subtle and conservative assessments that foresee a world of ever more frequent disasters in a warming world. It also gives a sense of hope, however, in its inclusion of a catalogue of measures at local, national and international level that successfully reduce disaster risk. It suggests that such measures will need to be significantly scaled up, alongside deep cuts in greenhouse gas emissions, if countries and communities are to avoid the worst disasters in a changing climate. The report is also clear that in some cases upgrading existing approaches will not be enough and more systemic transformations will be required.

**Key Messages**

1. **Even without taking climate change into account, disaster risk will continue to increase in many countries as more people and assets are exposed to weather extremes.** The greatest accumulation of risk is in fast growing middle income countries, which have experienced the highest percentage of disaster losses in terms of Gross Domestic Product[2]. This is caused by population growth, rapid urbanisation, changes in socioeconomic status and settlement patterns increasingly oriented towards the coast and deltas. These trends explain the vast majority of increases in economic disaster losses over the last decade, with the IPCC finding a lack of reliable evidence to attribute such losses to climate change. Accordingly, understanding the dynamics of exposure and vulnerability is crucial to the success of strategies designed to reduce disaster risk and adapt to climate change. The IPCC highlights economic, social, demographic, cultural, institutional, governance and environmental factors that explain differences in vulnerability to an exposure. For instance, poor African-Americans were hit particularly hard during Hurricane Katrina; elderly were particularly vulnerable during the European heat waves of 2003 and 2006 and there are many examples where women suffer bigger disaster impacts than men, because of their daily activities and their position in society.
2. **Evidence suggests that climate change has changed the magnitude and frequency of some extreme weather and climate events ('climate extremes') in some regions already.** However, data varies considerably in quality and quantity for different extremes and regions. This does not rule out the possibility that climate change can be blamed for the trends, just that the evidence is not strong enough to justify such a conclusion at this time. Examples of where the evidence is strong enough include a

greater than 90% probability that the number of very cold days has decreased and the number of very hot days has increased globally where data is sufficient. There is greater than 66% certainty that this trend is caused by anthropogenic climate change. The IPCC finds similar, but less certain trends relating to intense rain and snowfall precipitation but suggests that there is only low confidence that any trends in tropical cyclone activity can be linked to human influences.

3. **Climate change will have significant impacts on the severity and magnitude of climate extremes in the future. For the coming two or three decades, the expected increase in climate extremes will probably be relatively small compared to the normal year-to-year variations in such extremes. However, as climate change becomes more dramatic, its effect on a range of climate extremes will become increasingly important and will play a more significant role in disaster impacts.** Headline projections include greater than 90% certainty that heat waves will increase globally through the 21st century and more than 66% certainty that a current once in 20-year heat extreme will become a once in 2-year extreme by the end of the century in most regions. Heavy rainfall events, as a proportion of total rainfall, are also likely (>66%) to increase, including heavy rain associated with tropical cyclones. There is medium confidence that droughts will intensify in the Mediterranean, central Europe and Southern Africa, among other areas, but projections are hampered by the complexity of drought modelling. There is greater than 90% certainty that a mean rise in sea levels will create more extreme sea levels (e.g. those associated with storm surges). The trends for tropical cyclones are less clear, but there is a suggestion that these will be more severe but that the frequency will decrease or stay the same.
4. **There is better information on what we expect in terms of changes in extremes in various regions (rather than just globally).** For some regions and some extremes however, uncertainty about future trends remains high. For instance, in northern Europe, there is high confidence in a very likely increase in heavy rain and snowfall. In most of Africa however, there is low confidence in projections of future heavy rainfall events (with the exception of East Africa, where there is medium confidence in a likely increase in such events, which in IPCC language means a 66-100% chance). The uncertainty is particularly high at local levels, where many risk management decisions need to be taken. Climate change may result in increases in frequency of extremes already experienced today, but also in unprecedented extremes, such as heat or heavy rainfall not experienced before, or cyclones hitting areas they have not reached in the past. When the IPCC provides low confidence in trends in extremes, this does not necessarily mean the risk is low. Such uncertainty could imply the trend is either stronger or weaker than our current best guess. Climate extremes are essentially becoming more unpredictable. It is clear that climate extremes are becoming more unpredictable.
5. **High levels of vulnerability, combined with more severe and frequent weather and climate extremes, may result in some places, such as atolls, being increasingly difficult places in which to live and work.** As an example, the SREX Summary for Policy Makers refers to low lying atolls, exposed to extreme sea levels, but others may include areas subject to recurrent droughts or more severe heat stresses. Significant impacts are likely to be concentrated in developing countries, but developed countries may also be seriously affected. When taking account of population growth, changing settlement patterns and more extreme sea levels, Vafeidis et al (2011) estimate that the number of people exposed to coastal flooding in Asia will increase by 50% by 2030 (increase from 2000 levels). Changes to the spatial distribution of some extreme events in a changing climate may result in new areas being exposed to extremes, potentially leading to previously unseen impacts. More severe and frequent disasters and

disaster losses will also impact those not directly involved as effects may be transmitted to others through interruptions to production and supply chains and increasing food and commodity prices.

6. **A new balance needs to be struck between measures to reduce risk, transfer risk (e.g. through insurance) and effectively prepare for and manage disaster impact in a changing climate. This balance will require a stronger emphasis on anticipation and risk reduction.** The balance can only be achieved following an assessment of risk and potential losses, a consideration of what resources are available and how much risk stakeholders are willing to accept. Developed countries are often better equipped financially and institutionally to adopt explicit measures to effectively respond and adapt to projected changes in vulnerability, exposure and climate extremes than developing countries, although all countries face challenges in assessing and responding to projected disaster risk. Smaller or less diversified countries face challenges in providing the public goods associated with disaster risk management, in absorbing losses and in providing humanitarian assistance.
7. **In this context, existing risk management measures need to be improved as many countries are poorly adapted to current extremes and risks, let alone those projected for the future.** Under conditions of uncertainty, "low-regrets" investments offer **d**evelopment benefits irrespective of future changes to the climate while helping to address current levels of disaster risk. Effective low-regrets measures include early warning systems, land use planning, development and enforcement of building codes, improvements to health surveillance and ecosystem management and restoration. Where certainty is stronger, governments and other actors may choose to make more targeted adjustments in specific investments, directly based on the climate information.
8. **Countries' capacity to meet the challenges of observed and projected trends in disaster risk is determined by the effectiveness of their national risk management system.** Such systems include national and sub-national governments, the private sector, research bodies, and civil society including community-based organisations. These actors work in partnership across scales, supported by relevant scientific and traditional knowledge, though specific characteristics of national systems vary between countries and across scales depending on their size, economic status and administrative structures.
9. **In cases where vulnerability and exposure are high, capacity is low, and weather and climate extremes are changing, more fundamental adjustments may be required to avoid the worst disaster losses.** SREX refers to these as 'transformation', compared to 'incremental' changes. Transformation refers to fundamental changes to the attributes of systems, including values, regulatory, legislative or bureaucratic regions, financial institutions and technological or biophysical systems. In this context, such changes may involve placing disaster risk management at the heart of economic and social policy as we have seen in Bangladesh or the Philippines, crafting new legislation and implementation frameworks as in South Africa, relocating people and assets as in Mozambique, or simply changing the mindset of powerful individuals, allowing for new approaches (Pelling 2011).
10. **Any delay in greenhouse gas mitigation is likely to lead to more severe and frequent climate extremes.** SREX presents a set of diagrams showing projected climate extremes in the middle and end of the century. These clearly show that the faster the rise in greenhouse gas concentrations rise, the more frequent the extremes in temperature and rainfall will occur. The implication is that lack of progress on greenhouse gas mitigation from one country may result in disaster losses in another and have an impact on their ability to adapt or manage disaster risk in the future. Disaster risk management, adaptation,

development and mitigation are therefore in a symbiotic relationship, involving tradeoffs in values, costs, damages and opportunities at local, national and global scales.

**Implications of the Report**

The report represents a significant step forward for the integration and harmonisation of the climate change adaptation, disaster risk management and climate science communities. Definitional divisions have largely been closed, with SREX producing a joint definition of vulnerability and exposure for example that represents a departure from the definition used in the IPCC fourth assessment report (IPCC 2007).

Politically, while the report does not include enough specific information on which one would wish to base wise policy at national or subnational scale, it does offer a solid basis and a set of findings that can serve to pique the interest of influential policy makers hitherto unfamiliar with the seriousness of this issue. Internationally, the report may help to (i) strengthen the integration of financial mechanisms to support adaptation and disaster risk management, (ii) add clarity and energy to the development of the UNFCCC Loss and Damage mechanism (intended to help support developing countries impacted by disasters associated with climate extremes) (UNFCCC 2011), (iii) focus minds on the importance of mitigating greenhouses gases for avoiding the worst climate extremes and (iv) reveal the importance of changing climate extremes and disaster risk to policy makers working in other policy domains.

Certainly the report signals a need for countries to reassess their investments in measures to manage disaster risk. New disaster risk assessments that take climate change into account may require countries and people to refresh their thinking on what levels of risk they are willing and able to accept. This comes into sharper focus when considering that today's climate extremes will be tomorrow's 'normal' weather and tomorrow's climate extremes will stretch our imagination and capacity to cope as never before. Smart development and economic policies will need to consider changing disaster risk as a core component unless ever more money, assets and people are to be washed away with the coming flood.

**References**

IPCC (2007) Fourth Assessment Report, IPCC, Geneva. Available online: http://www.ipcc.ch

Pelling, M. (2011) *Adaptation to Climate Change: From Resilience to Transformation.* Routledge

UNFCCC (2011) 'Document FCCC/SBI/2011/INF.13: Synthesis report on views and information on thematic areas in the implementation of the work programme'. Available online: http://unfccc.int/resource/docs/2011/sbi/eng/inf13.pdf

Vafeidis, A., Neumann, B., Zimmermann, J. and Nicholls, R.J. (2011) Analysis of land area and population in the low-elevation coastal zone. Commissioned by UK Government Foresight Project, Migration and Global Environmental Change. Available online: http://www.bis.gov.uk/assets/bispartners/foresight/docs/migration/modelling/11-1169-mr9-land-and-population-in-the-low-elevation-coastal-zone.pdf

Disclaimer: While both the authors of this blog are Co-ordinating Lead Authors of the IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, and members of the Core Writing Team of the Report's Summary for Policy Makers, the article does not represent the views of the IPCC or necessarily of either of the author's host organisations.