

4th IGBP Congress: Report from Working Group Session D4

Thursday 8 May 2008

Below is the report from the Working Group Session D4 for speakers and abstracts see http://www.igbp2008.co.za/speaker_abstracts.php?id=22 .

D4: Water cycle, water resources, floods and drought

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There are 1.1 billion people without clean drinking water and 2.2 billion without adequate sanitation. There will be increasing water stress in 21st century, particularly in the developing world as demands from the domestic and industrial sector, particularly, are expected to increase rapidly. A major question for the future is how increasing water stress will dampen demand across the sectors (agriculture, industry, domestic and nature) and how conflicts between these sectors will be resolved.

Biodiversity loss in freshwater systems is already higher than in other terrestrial and marine ecosystems. There will be increasing conflict between the needs of humans and nature in the future. There have been considerable increases in loads of phosphates and nitrates in rivers in the last decades – although the exact nature of these is very specific to particular catchments – depending on the agricultural and urban environment in the upstream catchment. In terms of water quality the direct effects of human activities far outweighs the impacts of climate change – but will this continue? if, for example, rainfall in some semi-arid environments decreases dramatically.

There are considerable problems with the quality of regional simulations of rainfall (and runoff) for the present and future – particularly with regard to the seasonal patterns and extremes. There is a need for climate scientists, hydrologists and water resources scientists to work closely together to produce better simulations of the future water resources – flow, ground water, management practices etc. There also needs to be a better understanding across the communities of the limitations of these simulations.

To improve the better representation of biogeochemical cycles within earth system models we need to improve the hydrological representation (soil moisture, wetlands etc) and understand the limitations of these parameterisations.

Issues around trans-boundary water resources are important in many parts of the world – where there are problems with water rights, equity, political uncertainty and restrictions. However, Water can be seen as a source of collaboration as well as conflict.

Research needs

1. We need better methodologies to link global and river basin analyses – both in the downscaling of global models and utilising basin scale processes to the global models.
2. We need to consolidate better the hydrological data we have – particularly on monthly, daily and sub-daily time scales, ensure existing networks are maintained and ensure access to these data.
3. We need better regional simulations – particularly with regard to improved dynamics of atmospheric models – to improve the simulation of seasonality, monsoons etc. This also requires improved understanding of feedbacks at a regional scale.
4. We need better coupled biogeochemistry, water and climate models.
5. We need capacity building in developing countries – to provide improved local capability in data collection, analysis and modelling.

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