

Rivers buckle under pressure from climate, dams

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Climate change is likely to intensify the alarming rate of degradation of the world's rivers and wetlands unless water resources are better managed, according to a special issue of the international scientific journal *Marine & Freshwater Research* published online today.

Rainfall runoff and water availability will be increasingly affected in the next four decades, with the tropics probably getting wetter and dry regions becoming drier, say leading water researchers in the issue, which is devoted to problems caused by water resource development and to providing solutions for improved management in an era of climate change.

Climate modelling is also predicting increases in the extremes of floods and droughts. As well, increasing temperatures are causing rivers around the world to change their flow patterns, particularly where they rely on snow melting.

Rivers and wetlands are already degrading more than any other ecosystem – with growing impacts on global biodiversity and on human communities that depend on river flows, says UNSW's Professor Richard Kingsford, Director of the Australian Wetlands and Rivers Centre, who edited the special issue. "The world is watching how Australia manages the over-allocation of rivers caused by dam-building and increasing effects of climate change," says Professor Kingsford.

"Australia is the driest inhabited continent. Climate change is likely to

increase the challenges we already face concerning the sustainability of our rivers, particularly as a result of building dams and the over-allocation of water resources in the Murray-Darling Basin."

The special issue of *Marine & Freshwater Research* brings together 10 leading researchers whose papers cover improved management of dams, better conservation planning and the poor record for wetland and river conservation around the world. "We have brought together two of our world's major environmental issues in this special issue – management of over-allocated rivers and climate change," says Professor Kingsford.

Several authors note that climatic changes will have significant implications for ecological and human communities dependent on water. In dry regions, large wetlands will become drier. In coastal regions, rising sea levels will affect coastal lagoons. Decreasing flows as a result of less rainfall and higher temperatures will increase the impacts of salinity and acidification.

"We will increasingly have to think about the way we deal with the shifting goalposts caused by [climate change](#), particularly in the dry parts of Australia, including the Murray-Darling Basin," says Professor Kingsford. "There is a predicted 10% reduction in flows in the rivers of the Murray-Darling and, given the poor state of many wetlands, this is of particular concern."

Other authors suggest ways for improving resilience, including greater environmental flows in rivers, altering dam operations, improved management of conservation areas and ensuring good processes of adaptive management and governance. "We will need to pull all these levers if we are going to chart a future course to sustainability," explains Professor Kingsford.

Increasing environmental flows in regulated rivers remains one of the

more important policy and management options for improving the health of rivers and wetlands. Extreme weather events will put pressure on dams, possibly requiring reviews of their safety. In one of the papers in the special issue, Dr. Jamie Pittock, a researcher at the Australian National University and a lead author of two papers, argues that there should be a review of the costs and benefits to society and ecosystems of such infrastructure. This is now well established in parts of the world through a time-limited licensing system. “We need to make sure that we are deriving all the benefits of dams over the long term and we should be periodically re-examining our options by thorough cost-benefit analyses” says Dr. Pittock. Improved management of environmental flows from dams will significantly help in the long term. This could include raising temperatures closer to natural temperatures by releasing water closer to the dam surface, using floodplains to reduce the impacts of flooding, and releasing pulsed flows so that they allow different animals and plants to complete their life cycles.

Identification and management of conservation areas (e.g. National Parks) was identified by authors in the special issue as one of the major areas for improvement. “We should be using well established methods for working out where the next wetland acquisitions for our national parks should be and – just as important – we need to focus on effective management including the protection of flows to these areas,” said another author Professor Max Finlayson. Most of the National Parks and internationally important wetlands listed under the Ramsar Convention in the Murray-Darling Basin are degrading because governments have not protected flows to these areas.

Finally, the *Marine & Freshwater Research* special issue identified that governments around the world are failing to sustainably manage rivers and wetlands because the management objectives are often not clear. “Managers need to be more accountable for sustainable management by specifying what it is they are aiming to do and then measuring whether

or not they have achieved this,” said Kingsford. “Unless communities and their governments start to implement such strategies, then long-term sustainability of [rivers](#) and wetlands will just remain an illusion.”

More information: Marine & Freshwater Research - The synthesis paper Conservation management of rivers under climate change – a synthesis is freely available for download at [www.publish.csiro.au/view/jour ... fm?nid=126&f=MF11029](http://www.publish.csiro.au/view/jour...fm?nid=126&f=MF11029) .

Provided by University of New South Wales

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