

*Queensland floods: How quickly is Australia being washed away?* 1

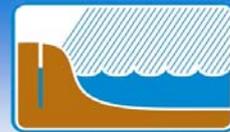
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## QUEENSLAND FLOODS: HOW QUICKLY IS AUSTRALIA BEING WASHED AWAY?

Gerald Nanson, University of Wollongong

The powerful, turbulent, red-brown sediment-laden water gushing across our TV screens this past few weeks, sweeping all in its path before it, have caused us to be shocked by the awesome force of nature and the terrible toll it has wrought on life, property and public infrastructure.

Yet again, after Australian communities have buried their dead and rebuilt their structures, long-term questions will remain. The floods will return with the rains in the years or decades to come but the red-brown soils are lost, increment-by-increment, forever.

The floods of Queensland have raised important issues relating to how well Australia collects data that is vital for the accurate analysis of potential hazards, and how adequately our country understands and therefore is prepared to deal with our extreme environmental hazards.

This has been a month of grand pronouncements from our senior politicians, with fully deserved declarations of sincere sympathy for the afflicted, pronouncements of how stoic are our citizens in the face of adversity, and promises of remedial action peppered with plans for reconstruction. Quite frankly, we have to be stoic because our politicians and senior bureaucrats over the years have not done the job they should have to prepare and protect our communities. We are declaration rich and action poor.

We have one of the world's most variable climates and our climate and river gauging stations need to be operated for many decades and even centuries in order to characterise and analyse such variable regimes – yet for budgetary reasons they are often shut down with inadequate records after a few years of operation.

Sediment monitoring is limited to so few locations that it is of very little scientific value. While climate change could well be making these variable events even more hazardous, we won't know this for sure for decades to come and reference to this possibility is often an unwarranted distraction. It is the presently known and unvarnished severity of these repetitive events that we must respect and address.

Europeans took most of their first century of occupation of the continent to appreciate the

repetitive nature of such hazards, however we appear to have squandered much of the subsequent centuries by not investigating their very serious risk in detail. As a nation we have not put the hard yards into analysing how best to anticipate and deal with them.

The risk to the lives of this generation is serious enough and commonly tragic; the loss for future generations will not only be lives but the stripping of topsoil from our catchments and degradation of our agriculture.

While we have a large and very capable group of scientists in universities, consulting companies and government research institutions who are well able to analyse these problems and advise on remedial measures, they have been poorly served by our state and federal agencies that have provided precious little good data for analysis.

While the Brisbane River is well gauged and has been for more than a century, it is a rare exception on a continent where rivers are our lifeblood and soils are our foundation for agriculture. While Australia has relatively very few well-gauged rivers, just as astounding is that we have almost no data on how much sediment our rivers carry.

This is an inexcusable shortcoming for modern, industrialised, well-educated nation in the modern age. Quite frankly, the government agencies responsible for such basic data collection on flood frequencies, sediment yields and the relationships between drought, fire and flood have been out to lunch, for more than a century.

As well as killing scores of people and destroying homes and livelihoods, fires denude catchments of protective vegetation. Floods clearly represent a similar hazard to life and property, but less well appreciated is that they carry vast quantities of soil, much of it lost permanently from agricultural production, to locations where it severely damages estuaries and coral reefs.

Droughts, fires and floods are commonly related hazards and there are benefits in studying their serial impact in an integrated way. The headwa-

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ters of some of our larger and steeper catchments are forested, and the El Nino decades of drought and fire are commonly followed by a La Nina year and devastating floods, such as this year.

With the data collection hopelessly divided between state, federal and even private bureaucracies, there are enormous gaps in what most developed nations would regard as a minimum data set upon which to scientifically assess and interpret the risks faced by their citizens. Without good data collected over many decades, the risks of drought, fire and flooding to life and property, and the longer-term impact of soil losses, cannot be accurately assessed.

The resulting ambiguities and inevitable arguments enable developers to often circumvent the efforts of regional and urban planners to set acceptable stands for the development of safe and sustainable communities.

New Zealand, Canada and the USA have much more methodically acquired and vastly superior sets of data on river discharge and sediment yields following many decades of systematic sampling by government agencies. Fire is a hazard with

special relevance to Australia, a continent that has over millions of years evolved both highly flammable vegetation and vast areas of relatively infertile topsoil. So with little good soil and where drought, fire and deforestation strip what protective cover there is, we have almost no real data on just how much soil is being lost.

We simply cannot answer what is nationally a truly important question: 'How quickly is Australia being washed away?' In the absence of actual data, bureaucrats have resorted to the quick and cheap, and we certainly got in value what we paid for! They funded scientists to 'model' runoff and soil losses associated with the sort of flooding we have seen in recent months across Queensland. But these models, despite the best efforts of the scientists involved, are virtually useless because there is insufficient real data to accurately 'tune' them.

Incongruously, we have just enough data to show how inadequate the models are. While New South Wales may see itself as the most populous and therefore sophisticated state, actually Queenslanders have done a substantially better job at collecting river flow and sediment data. However, neither state can compare with

those countries mentioned above.

The Howard government committed 10 million dollars to improving data collection as a part of the 10 billion dollars allocated to correcting the water problems of the Murray-Darling basin, but such a sum is woefully inadequate to fill such a nationwide information black hole, and it's unclear at this stage just how effectively even that small sum has been spent.

It is time the appropriate ministers and their chief bureaucrats for each of the state water authorities met with their federal counterparts to institute a truly national network of basic data collection. If this were to be done tomorrow, it would still be decades before the data would be of sufficient volume and value to adequately assess the enormous problems we face in dealing with our natural hazards.

Regardless of what climate change may do to worsen our situation, we must not sit on our hands and maintain this state of scientific ignorance for another decade, or worse, another century.

*Professor Gerald Nanson, is a lecturer at the School of Earth and Environmental Sciences, University of Wollongong <http://www.uow.edu.au/>*

## SPILLS INTO CONSTRUCTED URBAN WETLANDS: THE NEED FOR A RESPONSE PLAN

Brett Ibbotson, Eco Management Services Pty Ltd

Most people in the water industry would have noticed the steady increase in constructed urban wetlands appearing around Adelaide, many as part of the "Waterproofing" programs designed to secure Adelaide's water supply and limit our reliance on the Murray River.

Part of this need to secure Adelaide's water supply is as a result of population growth in the greater Adelaide region. A growing population will require greater local production and import of materials from interstate and overseas. It is likely

then, with increased industry production and movement on our transport networks, that the risk from spills of dangerous or noxious substances will increase. The questions then arise: how will the spill impact on wetland performance and objectives; and how long is this disruption likely to last?

The term 'spills' can cover a number of incidents including vehicle accidents (particularly those involving bulk carriers), industrial accidents (including fires), and illegal dumping. In each case the potential threat is

the same: a dangerous or noxious substance entering the drainage network and potentially discharging into one of our many constructed wetlands. For those of you that are familiar with constructed wetlands and their objectives you may say, 'well that is what they are there for – intercepting pollutants and protecting downstream ecosystems!'

It is true that in the past many urban wetlands were constructed for this purpose, and have contributed significantly to reducing pollutant export

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to our coastal seagrass beds and Port River waterways. Even though wetlands are generally designed to intercept pollutants, the loads imposed by some accidental spills could greatly exceed loads generated by urban run-off.

For instance; Copper Chrome Arsenate (CCA) is a wood preservative usually transported in 1000L IBCs (independent bulk carriers). A spill of 1 IBC has the potential to release 478kg chromium and 433kg of arsenic, by comparison urban catchments generate annual yields of around 0.24-1.0mg/m<sup>2</sup> and 0.09-0.23 mg/m<sup>2</sup> of chromium and arsenic respectively depending on land use in the catchment.

The design objectives for a constructed urban wetland generally include one or all of the following: stormwater pollutant reduction, increase in public amenity of the area, increase in habitat and biodiversity, and water harvesting. A spill is likely to compromise these objectives to varying degrees depending on the severity of the spill.

Many factors influence the severity of a spill in a wetland. The most obvious is the size and the toxicity of the spill but there are many other factors to consider such as:

- Hydrologic conditions of the wetland: during summer conditions the wetland is likely to have low water levels with no flow, facilitating greater ease of containing the spill. Alternatively in winter the high water levels and flows through the wetland will make containment difficult, particularly with inundation of macrophyte (reed) areas.
- Substance properties: the physical properties of the spill substance will determine how far it is transported and where it will be deposited. A floating substance such as oil will disperse on the water surface and could enter macrophyte

areas. Other substances, such as heavy metals and some pesticides, have an affinity for particles and tend to accumulate in wetland sediments. Additionally the persistence of the substance and its effects will determine the recovery time of the wetland. A spill of a substance with high biochemical oxygen demand (BOD), such as wine, milk or sewage, may have some severe short-term effects (e.g. removal of soluble oxygen, fish kills, odours), however system recovery will likely be rapid once these substances have been completely degraded. A spill of a persistent pesticide, such as Atrazine (used widely in Australia) may have severe short term, and long-term impacts on the wetland.

The recovery of the wetland is very important. Where a spill has caused damage to the wetland ecosystem, the pollutant reduction performance of the wetland could also be reduced for weeks, months or years, depending on the severity and reaction to the spill. Monitoring of water and sediment quality will play an important role in assessing the recovery of the wetland and determining when mitigation strategies, such as revegetation or reintroduction of native fish species, is appropriate.

There is little information available on the appropriate course of action to take if spills enter constructed wetlands. Emergency services and the MFS are the primary respondent to spills and fires and aim to limit the entry of contaminated water into the drainage network. In certain circumstances this will not be possible and contaminated water will enter the wetland.

The response to a spill entering the wetland will depend on many factors, some of which were outlined above. It is important that respondents are prepared, are appropriately resourced, and have a plan to follow that allows for timely and effective measures to be taken.

The purpose is to minimize the im-

act on the wetland and aid in system recovery. This could include such information as deployment points for absorbent booms and potential isolation points in the wetland that will limit the extent of damage.

Another important consideration for spill responses into wetlands is the need for a response at all. While spills do have the potential to cause widespread damage to a wetland, so does the response to a spill. In the event of a spill, respondents without a working knowledge of the wetland may feel compelled to do something about the spill in the face of media and public attention.

For example; a small oil spill, due to its floating properties, may disperse over the wetland and enter macrophyte areas. While the use of absorbent pads or material to absorb oil on the surface in easily accessed open-water areas may be appropriate, care must be taken regarding the level of disturbance as a result of the response. Many persons trampling around the wetland and trying to remove oil from macrophyte areas can cause more impact and long-term effects on the wetland than if the oil was left to degrade by natural processes.

Although there are many substances and factors to consider regarding spills into constructed urban wetlands the task is not so great that it should be put in the 'too hard basket'. Substances can be broadly grouped according to their properties and general response actions determined to ensure the damage, and subsequent recovery time, of the wetland is reduced. It is best to be prepared than to wonder after the event what might, or should, have been done.

*Eco Management Services were recently commissioned by Port Adelaide Enfield Council to prepare a spill contingency plan for the Gillman wetlands. The article presented here represents some of the key findings from the study. For further information please contact [brett@ecomangementservices.com.au](mailto:brett@ecomangementservices.com.au)*

## UPCOMING EVENTS



**Portraying seasonal groundwater interaction with the Daly River, NT. A sketch comprised of environmental tracers and simple flow models**

Brian Smerdon, Research scientist in the Groundwater Hydrology program

**Day:** Wednesday April 6, 2011

**Time:** 4pm start (3.45 afternoon tea), 5pm finish

**Venue:** CSIRO Seminar Room, Building 1, Waite Road, Urrbrae. Entry via Gate 4, Waite Road.

<http://www.clw.csiro.au/division/adelaide/seminars/abstracts11.html#smerdon>

For further details please contact Jan Mahoney 8303 8417

The Daly River is one of few rivers in the Northern Territory to flow throughout the dry season. Groundwater maintains this base flow in the river, which in-turn supports a diverse aquatic ecosystem that has significant cultural value. There is increasing interest in developing the water resources of northern Australia, with particular focus on using groundwater for irrigated agriculture. Balancing the apparent competition for groundwater resources will rely on understanding the seasonal dynamics occurring between groundwater and the Daly River.

This seminar will focus on how the combination of environmental tracers and simple groundwater flow models aid in determining the nature of water exchange between a productive aquifer and tropical river. The results of water samples collected from the river, springs, and groundwater are used to interpret groundwater exchange with the river and the apparent age of water. Seasonal dynamics are portrayed by replicating field observations with a numerical flow model.

**GOVERNMENT TECHNOLOGY**  
REVIEW

presents

WATER BUSINESS  
**Australia**

# Water Australia Summit 2011

**Australia's Premier Water Management Event**

**Wednesday 20th - Thursday 21st July, Dockside, Darling Harbour, Sydney**

<http://www.halledit.com.au/water2011>

The Water Australia Summit will be a flagship forum for Australia's \$90 billion water industry, attracting more than 250 senior-level attendees, representing major water utilities, financiers, project planners, policy heads and industry leaders.

The theme for this summit & expo is *"21st Century Water Management Solutions."* This summit will feature a water management technology expo, offering industry suppliers the opportunity to demonstrate products, services and water management solutions.

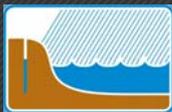
This industry expo complements the 2 day summit that focuses on managing the commercial and business challenges

of water supply and demand, while identifying major new contracts and projects in Australia and internationally.

40+ CEO speakers will share a 21st century action plan to manage water resources, while ensuring security of supply across cities as well as, urban and regional areas. Discussions also focus on water trading, a renewed rescue package for the River Murray, impact of climate change, demand management strategies and the investment outlook for water.

Delegates to this water summit will represent public and private sectors from Australia, New Zealand, Asia, the Middle East, Europe and North America, offering an excellent platform to showcase water management solutions

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There are currently vacancies for two committee members

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## MEDIA WATCH

**Water infrastructure charge rules**

New rules have been made under the Water Act 2007 to regulate charges levied by water infrastructure operators in the Murray-Darling Basin. The water infrastructure charge rules were registered on 11 January 2011 and have legal effect from 12 January 2011.  
<http://www.environment.gov.au/water/australia/water-act/infrastructure-charge-rules.html>

**COAG reform of Ministerial Councils**

At its meeting on 13 February 2011, the Council of Australian Governments (COAG) agreed to form two new COAG standing councils on primary industries (including biosecurity), and environment and water.  
<http://www.mincos.gov.au/home>

**Water Pollution Solution—New York Experiments with Coal Tar “Sponges” in Hudson River**

For the last 18 months, research engineers and a New York state utility have been using a Hudson River contamination site as a laboratory, testing a new way to remove pollutants from riverbeds  
<http://www.circleofblue.org/waternews/2011/world/water-pollution-solution%e2%80%9494new-york-experiments-with-coal-tar-sponges-in-hudson-river/>

**CO2-chomping microbes battling for ocean iron**

Australian, Belgian and New Zealand scientists have expanded our understanding of the way phytoplankton take up scarce iron in the ocean – a process that regulates ocean food chains from the bottom up and helps remove up to 40 per cent of carbon dioxide (CO2) from the atmosphere.  
<http://www.csiro.au/news/CO2-chomping-microbes-battling-for-ocean-iron.html>

**Robotic glider to map Moreton Bay impacts**

A \$200,000 CSIRO coastal glider is bound for Queensland to be deployed in Moreton Bay to investigate the impact of the recent flooding on marine ecosystems.  
<http://www.csiro.au/news/Robotic-glider-to-map-Moreton-Bay-impacts.html>

**Water savings from willow removal**

Removing willows growing in the stream bed of creeks and rivers could return valuable water resources to river systems, new CSIRO research has found.  
<http://www.csiro.au/news/Water-savings-from-willow-removal.html>

**Forests and farms a flood solution?**

Development in Brisbane's flood-prone areas should make way for forests and farms as a form of flood mitigation, according to a Brisbane planning academic.  
<http://www.smh.com.au/environment/forests-and-farms-a-flood-solution-20110215-1av04.html>

**Bottled water banished from uni**

THE University of Canberra has become the first Australian campus to ban the sale of bottled water, setting what environmentalists hope will prove a template for the rest of the country.  
<http://www.smh.com.au/environment/bottled-water-banished-from-uni-20110120-19y3w.html>

**Uncharted Waters**

Victorians could be forgiven for thinking they'd been stranded in the forgotten floods this summer given so much of the focus has been on what's happened in Queensland. Yet as recovery and reconstruction gains momentum up north, flooding continues in rural Victoria and in some of the worst-affected areas paddocks will remain underwater for weeks.  
<http://www.abc.net.au/landline/content/2010/s3137505.htm>

**QLD floods highlight the cost of climate extremes**

After a long, hot period of drought in eastern Australia, spanning much of the 1990s and 2000s and referred to as the worst in 1000 years  
<http://bravenewclimate.com/2011/01/12/qld-floods-highlight-cost-of-climate-extremes/>

**Australian first in climate projections**

The first Climate Futures for Tasmania technical report, which projects the State's climate at a localised level until the end of this century, has been launched and its findings are being discussed with the communities who will use them.  
[http://www.acecrc.org.au/drawpage.cgi?pid=news&aid=797757&sid=news\\_news](http://www.acecrc.org.au/drawpage.cgi?pid=news&aid=797757&sid=news_news)

**Transition for water security in SA The State**

Government has accepted the recommendation from Water Security Commissioner Robyn McLeod that the position of commissioner is no longer required in South Australia as the state emerges from the drought.  
<http://www.premier.sa.gov.au/images/stories/mediareleasesFEB11/robyn%20mcleod.pdf>