6 July 2011

Hon Andrew Robb, AO, MP
Chair, Coalition Task Group on Dams
368 Centre Road
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By e-mail: Andrew.Robb.MP@aph.gov.au

Dear Mr Robb,

Submission to the Coalition Dams Taskforce

Coalition Task Group

I write to provide information to the Coalition Task Group on Dams. I have worked on sustainable management of rivers since the late 1980’s in Australian and abroad for non-government environmental organisations, with a focus on water infrastructure in the past decade. Since moving to the Australian National University I have published a number of peer-reviewed studies on better water infrastructure management.

I welcome the Coalition’s apparent interest in water infrastructure. There are major changes needed to management of dams, levees and other infrastructure. In this submission I will that there are investments required in dams to provide services but that an emphasis on new on-river dams is misplaced. Dams are one means to provide different water-based services. Good policy would first ask what services a society needs and then assess the costs and benefits of different options for meeting these needs.

Trade offs with dams

In January Tony Abbott MP is quoted as saying “I think it’s time that as a nation we put new dams back on our agenda and I think that the Queensland flood disaster makes this very timely indeed because dams can be flood mitigation devices as well as water storages. They can be a potential source of zero emissions power as well as water storages” (Liberal Party, 2011).

Management of large floods involves difficult trade-offs: flood control dams are not a simple solution. To catch a flood a dam has to be substantially empty and thus cannot maximize its potential to store and supply water to people or generate hydropower (WCD, 2000). Brisbane ran low on water during the Millennium Drought resulting in billions of dollars of investment in desalination and water recycling plants and pipelines (QWC, 2008), illustrating one of the costs in the trade-offs involved. No one dam can stop the largest floods, as we have seen with the flooding of Brisbane in 2011 despite the large Wivenhoe Dam upstream: at best dams only partially manage flood risk. Indeed flood control dams may only control moderate, beneficial floods and lull communities downstream into developing on floodplains, thus exacerbating risk in large floods. For instance, Brisbane is in the ridiculous situation of having hundreds of house at risk of flooding one year in two, yet many interviewees on media programs during the floods spoke of how they believed that Wivenhoe Dam had ‘flood proofed’
Brisbane. I argue that it is usually better to move people and critical infrastructure out of harm’s way rather than relying on engineering interventions and infallible institutions to manage them well in every flood. Similarly there are tradeoffs in managing dams to provide water for agriculture when hydropower generation requires water releases at inconvenient times. For example, Coalition representatives have complained that the operations of Snowy Hydro in releasing water - prioritising peaking power production - in the Murrumbidgee catchment may have exacerbated flooding in the past year.

In Australia the best sites for on-river dams have largely been developed and remaining sites usually have high environmental values, would displace many residents, or are inefficient. For instance, CSIRO concludes for Northern Australia that “There are significant constraints on the viability of surface water storages” (CSIRO, 2009). Many developed countries are now removing redundant or unsafe dams, for example, in recent years the Victorian Government spent AUD$60 million decommissioning a large water storage, Lake Mokoan (Victorian Auditor General, 2010). Water supply for urban areas is a valuable service yet there is a long list of proposed dams abandoned by Australian governments due to community opposition: Tillegra in New South Wales, Traveston Crossing in Queensland, Welcome Reef in New South Wales and Tennant in the Australian Capital Territory are among the most recent. The Coalition rightly opposed a number of these dams. I believe this near-systematic public opposition is no accident and it highlights the likelihood that policies predicated on new dams would fail to be implemented in a timely manner, if at all. A policy for new flood control dams invites the ‘nuclear question’: which valley would proponents inundate next, up river of Brisbane for example?

Global standards for dams

Conflicts over dams and other water infrastructure are a global phenomenon. In an attempt to resolve this conflict, the World Bank established the World Commission on Dams Including two Australian experts), whose 2000 report found that while dams provided some benefits, there was a persistent trend in dam projects costing more and delivering less than promised while having severe social and environmental impacts. The Commission recommended that governments and industry adopt a number of principles and guidelines for sustainable development of dams, in particular, a process to define what services are needed, and then the best options for proving such services (WCD, 2000).

More recently, to better operationalise standards for better development and management of dams, the Hydropower Sustainability Assessment Forum under the auspices of the International Hydropower Association (and including Hydro Tasmania and Oxfam Australia) has prepared a new sustainability protocol for hydropower dams, which can be applied to any dam (HSAF, 2009). This means that any Australian policy for new water infrastructure development that does not apply these standards will be criticised as not meeting world’s best practices.

Climate change and dams

Climate change forecasts suggest that more frequent extreme climatic and hydrological events are likely, including floods and droughts (Bates et al., 2008). While it is reported that many Coalition parliamentarians are climate change sceptics, the engineering profession has revised return intervals for extreme events, increasing safety standards for dams which requires expensive retrofitting of infrastructure, such as spillways. Dam projects are an inflexible, one to two decade development
proposition compared to the quicker, incremental ‘soft path’ alternatives (Gleick, 2002; Hallegatte, 2009). Already Australia’s hydro power operators have begun down rating their energy generation capacity. Indeed the future of our current stock of dams will come under greater scrutiny with climate change: the increasing loss of reservoir capacity, applying changing safety standards to aging dams, failing to deliver intended services due to changing hydrology, and emerging demands for new services from existing dams (for instance, as back up energy storage for intermittent renewable power generators) will see resources diverted from new dam proposals (Pittock, 2010; Bates, 2008).

Flood control

Flood control dam advocates instead need to consider the merits of a broader range of measures to manage flood risk including better land use planning and building standards, early warning, flood management institutions and insurance. A proven alternative is the restoration of large areas of flood plains in Europe, the United States and China to give rivers room to flood safely (Ebert et al., 2009; Yu et al., 2009; Opperman et al., 2009; Deltacommissie, 2008). These lands have been converted to more flood-resilient uses, including for extractive industry production, pasture, aquaculture and fisheries, forestry, recreation and nature conservation.

In the Netherlands, the government program “Room for the Rivers” is systematically setting back flood control levees along the nation’s levees and developing floodplains for nature conservation and recreation (Deltacommissie, 2008). One project involves reopening the Gerlderse Poort floodplain on the Rhine River, including through the extraction of historical clay, sand and gravel deposits, to create a 2,500 ha nature reserve that is increasing the safe flood discharge at the cities of Arnhem and Nijmegen from 15,000 m³/s before 2006 to 16,000 m³/s in 2015, and 16,500 m³/s in 2100 (Pittock, 2008). Dutch cities are also restoring ancient river channels as high-water flood ways around urban areas. Along the lower Danube River in Europe the governments have agreed to increase flood storage through restoration of 2,250 km² of floodplains and 14.4% has been or is being restored. In the lower Danube a flood in 2005 killed 34 people and caused EUR396 million in damages, whereas restoration of a larger volume of floodplains from farmland would cost an estimated EUR20 million and generate ecological services worth EUR50 million per year (Ebert et al., 2009). There is even the option of removing flood control capacity from dams on river like the Yangtze in China to generate more hydropower. This would enable dams to be operated as run of river to reduce downstream environmental impacts from changed hydrology, and a share of the extra hydropower revenue may be used to pay for downstream floodplain restoration (Opperman et al., 2009).

Dams and the environment

Freshwater ecosystems are among the most degraded globally due in large part to the impacts of dams (Nilsson et al., 2005; Pittock, 2008). It is no accident that in Australia the two biggest development proposals that have failed to pass environmental standards established under the Federal Environment Protection and Biodiversity Conservation Act 1999 (legislation adopted by a Coalition Government) were the Nathan and Traveston Crossing dams in Queensland (Peel and Godden, 2005). Moderate, over-bank water flows provide many benefits for people as well as the environment and should be accommodated (Reid-Piko et al., 2010). Such flows contribute to the recharge of groundwater aquifers that are important sources of water for people and livestock, especially during droughts. The current
flooding in eastern Australia will flush out salt accumulations following many years of drought and will stem the oxidation of wetland sediments to form acid that has afflicted parts of the Murray-Darling Basin. Iconic but degraded floodplain forests—such as Red Gum, Black Box and Coolibah—are being rejuvenated. Many pastoralists in inland Australia depend on beneficial floods to grow pasture for livestock, and the strong flows into estuaries and coastal waters will increase fish breeding and fish stocks. Wetland biodiversity will also benefit despite some downsides, including discharge of sediment onto coral reefs.

**Productive policy options for dams**

Having extensively criticised a focus on dams, rather than considering a range of options to deliver services, I will now outline two areas where Coalition policies on water should consider favouring more investment in water infrastructure.

a) Pumped storage hydropower

In order to enable increased deployment of intermittent renewable energy generators into the Australian grid, from wind and solar photovoltaic generators, excess energy needs to be able to be stored for use to meet peak demands. This is particularly important to keep power grids stable once intermittent generation reaches around 15% of capacity (as in South Australia). Technology proponents hope that smart grid systems will store such power in devices like electric cars in the future. In the meantime the only commercially deployed technology available is pumped storage hydropower, which uses excess electricity to transfer water from a lower to an upper reservoir for later hydropower generation, with 80% efficiency (Pittock 2010). There are already three large pumped storage stations in Australia. These systems can be retrofitted to some existing dams or even built off river to minimize environmental impacts. The Coalition could usefully support increased pumped storage capacity in Australia.

b) Reoperation of existing water infrastructure

Australia’s stock of water infrastructure is aging. Much infrastructure that was built in the 1950’s to 1980’s has outdated technology (such as inefficient turbines) or lacks basic environmental impact mitigation devices (such as fish ladders). Retrofitting old dams can increase safety, generate more hydropower, improve water quality and increase inland fisheries. Australia regulates large dam safety well but does not require dam owners to meet higher standards for non-safety related impacts. Worse, the thousands of small dams across Australia are erratically regulated, if at all. Any small dams are utterly redundant, for instance, weir built to supply steam trains with water. A 2001 inspection of 822 registered small dams in New South Wales found that 18% did not exist, 10% were redundant and could be removed, and that retrofitting fish ladders to another 16% would dramatically improve fish numbers. I argue that periodic relicensing at 30-50 year intervals of all Australian dams would enable the performance of each structure to be reviewed, and where improvements can be made the owners would be required to upgrade their structures (or remove redundant ones). This is a common practice in other countries, for example, the US Federal Energy Regulatory Commission has these requirements for non-Federal hydropower dams (Pittock and Hartmann, 2011). The Coalition could usefully propose such adaptive management of infrastructure in Australia.
I trust this information is of benefit to your Task Force and would be happy to provide further information on request.

Yours sincerely,

Dr Jamie Pittock

References:


