TOPIC ENVIRONMENTAL FLOWS

What is so special about the Mary River and its threatened ecological communities?

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Abstract

The Mary River catchment is home to many internationally and nationally threatened species. It has been identified as an aquatic biodiversity hot spot which provides unique habitat for its endemic threatened species. Australian governments have a responsibility to rehabilitate and restore degraded ecosystems and to promote the recovery of threatened species and ecological communities, rather than actively pursuing infrastructure choices which increase the threats to these species and ecosystems. To do this requires quantitative analysis of a species' local population size, structure and dynamics, areas of occupancy and critical habitat, and comparisons with long-term baseline data and other known populations. Without this knowledge of the population ecology of an area, there is no way of assessing the risk of extinction should a project go ahead and therefore no meaningful assessment of impacts or proposed mitigation measures. This presentation will use the proposed Traveston Crossing Dam as a case study to demonstrate how this proposal poses an additional threat to the threatened ecosystems of the Mary River in the face of climate change. An alternative catchment based approach is proposed for water security to achieve a better overall outcome for SEQ and threatened aquatic ecosystems of the Mary River catchment.

Summary of main points:
With climate change, relying on dams and pumping water from catchment to catchment are high risk and high cost solutions for reliable water supply. An alternative approach is proposed that will also save the Mary River.

Key Words:
Mary Catchment, environmental flows, Traveston crossing, EIS, endangered species, ramsar wetlands, northern pipeline interconnector, water grid, climate change, dams

Regional overview
South East Queensland is one of the fastest growing regions in Australia. Predicted growth is from 2.9 million people to 5 million by 2050 (Queensland Government, 2006). During 2006 and 2007, Brisbane appeared to be running dangerously close to running out of water. Water restrictions and water saving measures reduced demand

by half in the last 2 years 126 L/pp/day (Qld Water Commission, 2008). Currently the Queensland Government is planning to spend $9 billion on a water grid that will link 8 independent water supply zones to a connected SEQ Water Grid. This includes

- a purified recycled water scheme,
- a relatively small desalination plant at Tugan,
- proposed dams at Traveston crossing and Wyaralong,
- 400 km of interconnecting pipelines.

Current reliance on water from dams and weirs is about 95% with 6 dams providing 80% of the water supply. In Feb 2008, dam fill levels were at a 12 month high of 28% and at the close to the end of the wet season in April, they were at about 48%. (QWC 2008)

Now legislative and policy changes empowering the State Government to capture, store and transfer large quantities of water out of the Mary River Catchment into the proposed South East Queensland water grid place water security and the environment within the catchment at risk.

The Mary River catchment lies directly to the north of the Moreton catchment which encompasses Brisbane and extends about 300km further northwards to empty into the Great Sandy Strait Ramsar wetlands at Hervey Bay. Fraser Island, opposite the mouth of the Mary River is the world's largest sand island and a World Heritage Area.

With significant ecological conservation values, the Mary River catchment is situated in a biogeographical transition zone between tropical and temperate environments, and supports many plant and animal species of high national and international conservation significance. It has been identified in a number of studies as an aquatic biodiversity hot spot and contains a number of endemic endangered species.

The region's natural wealth is intrinsically linked to hard-to-measure intangibles such as patterns of flood pulses and the fertile silts suspended in its waters. In the natural state, small freshwater pulses and occasional large floods replenish the coastal wetlands. The unique pool-riffle-sandbank sequences of the Mary River floodplain provides a system of highly diverse freshwater aquatic habitats which are crucial to the survival of iconic endemic threatened species such as the Mary River Cod, the Mary River Turtle and the Australian Lungfish.

There are already many impoundments in the Mary, Burrum and Burnett catchments and flows into the Great Sandy Strait Ramsar Wetlands are now being seriously restricted. Impacts from these impoundments include release of greenhouse gases, unstable riverbanks, dispersive sediments, decreased and modified environmental flows, increasing salinity in Hervey Bay (Ribbe 2006) and devastating decline in fisheries and ecosystems. These long term impacts are accumulating with increasing demands for water.

The proposed water grid

Currently proposed sections of the SEQ water grid that could draw water from the wet (southern) end of the Mary catchment are the Northern Pipeline Interconnector (NPI) stage 1 and 2.

Stage 1 is planned to take water from Lake Baroon near Maleny, and Stage 2 is planned to take water from Lake Macdonald near Cooroy and from Lake Borumba via a pipeline connection from the main stream of the river. Stage 2 would also carry the water from the proposed Traveston Crossing Dam.

Relevant legislation

The Water Grid projects have been declared “significant” projects and under the State Development and Public Works Organization Act 1971 – all require an EIS. In accordance with the *Water Act* 2000 totally independent water resource plans were developed for the Mary and Moreton catchments. As the Mary Catchment contains matters of national environmental significance under the Federal Environmental Protection and Biodiversity Conservation (EPBC) Act 1999, these projects also require assessment at the federal level.

EIS and monitoring – theory

An EIS is intended to provide decision-makers with an understanding of the environmental consequences of a proposed action or project. The Terms of Reference provides the guidelines including how alternatives to the project must be considered. The intended scope is the full life cycle of a given project and its cumulative impacts. It serves to establish baseline data to assess likely impacts and assess risks. It also serves to establish clearer liabilities and be used as a tool to guarantee fulfillment of mitigation obligations. Previous findings can be used to support new proposals.

EIS and monitoring - reality

The environmental impacts of the SEQ water grid projects are being assessed in a piecemeal manner instead of as an interlinked suite of actions. Although integrated supply and demand planning is taking place within the SEQ region – the Mary catchment is outside the scope of this region. The net result is that the benefits of water supply from the Mary catchment into the SEQ water strategy are being accounted for, yet the water security and environmental costs to the Mary catchment and the Wide Bay region are not.

When considered in a wider regional context, the mish-mash of independent EIS studies fails to adequately address the principles of Ecological Sustainable Development (ESD) as required by EPBC Act. The following sections highlight some of the shortcomings in the EIS process.

Water resource planning and climate change predictions

The COAG National Water Initiative August 2007 review recommended that future water resource planning incorporate best practice climate scenario planning and restore the health of rivers by reducing over allocation and extraction.

The draft SEQ water strategy uses only a 10% reduction in surface water storage yields in response to climate change. However a predicted drop of 10% in rainfall for SEQ is more likely to result in a 30% decline in stream flow in the Mary Catchment over the 50 year life of the strategy (MRCCC 2008).

Already, measured stream flow at the Traveston Crossing dam site over the last decade (which includes major flood events) is less than 60% of the long-term averages used to develop the Mary Basin Water Resource Plan (STMRCG 2008).

The Mary Basin Water Resource Plan created a strategic reserve of 150,000 megalitres/year within the Mary catchment. This plan is often politically defended by a simplistic premise that maintaining in excess of 85% of the average annual flow at the mouth of the river is adequate for maintaining river health. In the case of a highly variable river with very complicated flow dynamics like the Mary, this simple premise is misleading and not scientifically based (Arthrington et. al. 2006). The Mary Basin Water Resource Plan is not endorsed by the Mary River community and there is no published scientific basis for the calculation of the 150,000 megalitres/year strategic reserve that the inter basin transfer is based on.

The Queensland Climate Change Centre for Excellence (2008) findings that pan evaporation may increase by 40% over the next 70 years, (25% to 2050) would further exacerbate (by 10000 megalitres/year), the evaporative losses already predicted of 40000 megalitres/year for the proposed Traveston Crossing Dam Stage 1 (MRCCC 2008). This potential would result in more than 50000 megalitres lost from the river system each year in addition to the projected 70000 megalitres / year yield of a dam at stage 1 of its proposed operation.

Current over- allocation.

At current levels of allocation, the Mary River already comes under extreme stress in most spring irrigation seasons and in dry years in general. The 2006/2007 water year saw the river with severe aquatic weed problems and fish kills associated with hyacinth and salvinia rafts and infestations of dense waterweed (*Egeria densa*). Water quality indicators for dissolved oxygen and salinity are often outside the EPA guidelines (MRCCC 2008).

During the 2006/2007 water year, irrigation allocations were severely restricted and very little fresh water flowed past the Mary River Barrage to the Great Sandy Strait. The river is reliant on regular minor flushes to maintain ecosystem health, and problems with river health caused by existing allocations and infrastructure indicate that the river is already effectively over allocated. The EIS is similarly full of assurances in respect of the ability of the dam to meet supply demand and maintain environmental flows, whilst admitting that climate is changing fast.

Cumulative impacts

Although seldom analysed, cumulative impacts occur when several dams are built on a single river and water is transferred between catchments. They affect both the physical (first-order) variables, such as flow regime and water quality, and the productivity and species composition of different rivers.

Downstream cumulative impacts on the ecological character of the Great Sandy Strait Ramsar Wetland have not been assessed in the draft Traveston Crossing Dam EIS or Northern Pipeline Interconnector EIS to date.

A major cumulative impact that the EIS process has not assessed is the combined impact of constructing Traveston Crossing Dam and the NPI will have on matters of national environmental significance, and the effect on habitat quality for listed threatened species. The planned operation of stage 1 of the proposed Traveston Crossing Dam and the NPI will increase the level of out-of-catchment transfer approximately five-fold over current levels, (without accounting for the evaporative losses associated with the proposals).

The following 2 examples from the EIS shows how at current full allocations, environmental flows can not meet the legislated environmental flow objectives of the Mary Basin Water Resource Plan now without any allowances for climate change or a future dam on the Mary River..

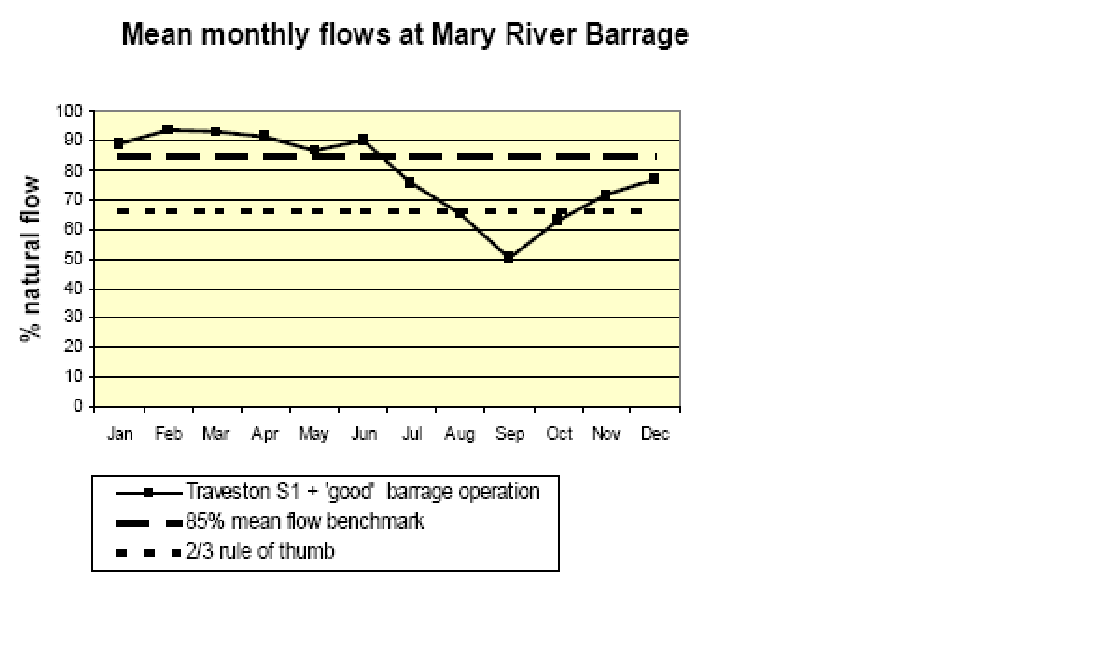

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Figure 23. Effect on mean monthly freshwater flow to the estuary past the Mary River Barrage (1890-1999). (Proponent's data from report 17)

Comments on proposed Traveston Crossing Dam EIS

Example 1: The above graph shows the proponent's mean monthly flow data from the EIS (Oct 2007). Even as far downstream from the dam site as the entrance to the estuary at the Mary River barrage, the proposal is predicted to reduce September flows to about half of their natural state and generally significantly reduce flows during the JASON months (MRCCC 2008).

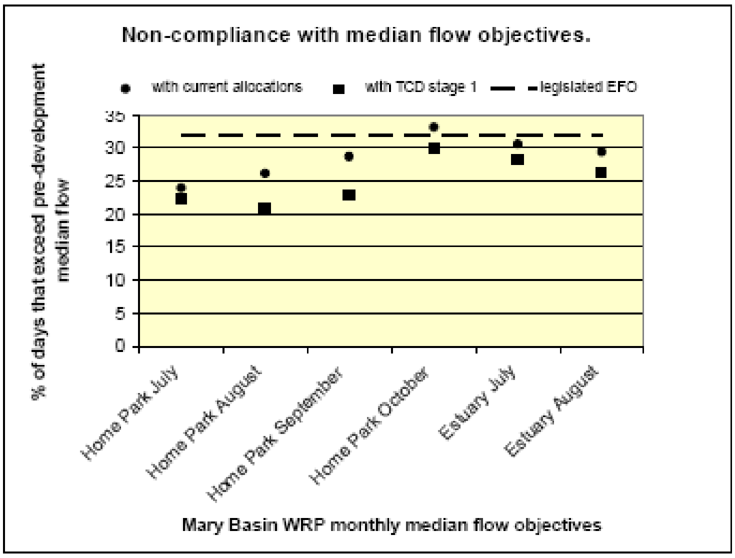

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Figure 24. Illustration that flows do not comply with median flow objectives in the full allocation scenario, and that TCD stage 1 increases the level of non-compliance.
(Proponent's data, EIS tables 6.37 & 6.38)

Comments on proposed Traveston Crossing Dam EIS

Example 2: The above graph from the data of the EIS (Oct 2007) illustrates the extent to which median ('typical') flows in the lower river would not comply with the environmental flow objectives in the Mary Basin Water Resource Plan if all existing water allocations were fully utilized. It also shows how much further outside compliance the flows would be if Stage 1 of the Traveston Crossing Dam came into operation. It is difficult to see how this intent to make matters worse than they currently are could be interpreted as 'minimizing' the extent to which flows don't meet the objectives, as required under the plan. It is also hard to see how current allocations can be supported and the operation of the dam optimized to bring these figures into compliance without reducing the stated yield of the dam by making specific environmental flow releases. (MRCCC 2008)

Risk of extinction of species

The EIS does not have basic population and life history information for most species, and this is certainly the case for the suite of threatened species recorded from the study area. No Population Viability Analyses or Population and Habitat Viability Assessments for endemic and/or threatened species or habitats– the excuse given is the lack of data and problems with reliability of some PVAs, but these are not valid excuses providing sufficient time and effort are made to adequately assess risks to threatened species. Such time and effort are actually a requirement of the Traveston Crossing Dam EIS Terms of Reference. The EIS is clearly incomplete without such analyses. This is a major flaw which is not remedied by the claim that: "Qualitative forms of assessment (such as expert assessment) are reasonable alternatives". Significant aquatic species endemic to the catchment are the Mary River Cod and Mary River Turtle. Other listed threatened species directly affected by the infrastructure proposals include the Australian Lungfish and Grey-headed Flying Fox (listed as vulnerable), and the Giant Barred frog (listed as endangered). Downstream impacts affect a wide range of listed species in the Great Sandy Strait.

The biodiversity assessment in the EIS for the Traveston Crossing Dam was based on 6 months of data collected over an abnormally dry season. The EIS showed poor knowledge of species present, population sizes, and population dynamics over time. No attempt has been made at assessing risk of extinction using industry standard tools such as Population Viability Analysis (PVA) or Population Habitat Viability Analysis (PHVA) (DeVantier 2008).

One of the core objectives of ecologically sustainable development is to "protect biological diversity and maintain essential ecological processes and life support systems." The precautionary principle further states "where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation".

The proposed infrastructure projects indeed pose threats of serious and irreversible damage, and the most appropriate measure available to prevent environmental degradation is to choose alternative water strategies that do not pose similar threats.

Can mitigation help reduce the risk of extinction?

The EIS provides a range of largely untried, unproven or unsuccessful proposals for mitigation. Suggested mitigation strategies must be supported with enough evidence to quantify their likely effectiveness. Monitoring and research (as proposed as a mitigation strategy in the EIS for the Traveston Crossing Dam) are not acceptable mitigation strategies in themselves.

An appropriate assessment would first quantify risks and threats under current conditions, then outline the additional risks posed by the project, then quantify the likely effectiveness of proposed mitigation measures. The residual risk posed by the project would then be used as the basis of the assessment.

Approximately 10 years of monitoring and research would be needed to quantify these risks for the Australian lungfish alone (Prof. J. Joss pers com). Until then – the precautionary principal should prevail, particularly because there are viable alternative water strategies available which do not pose the same risks to biodiversity.

Strategic environmental impact assessment

The EIS for the Traveston Crossing Dam proposal (and the Northern Pipeline Interconnector) need to encompass a wider range of options, investigate all aspects (not just economic) of the relative advantages and disadvantages of proposed water supply portfolios for South East Queensland simultaneously with the wider regional implications for future water supply and regional-scale environmental impacts security within in the Mary Catchment.

A multiple-criterion comparison that considers the key issues of the Traveston Crossing proposal with a number of alternate water supply are detailed in Table 1.

Table 1: A multiple-criterion comparison of a number of water supply options against the Traveston Crossing Dam proposal (MRCCC 2008).

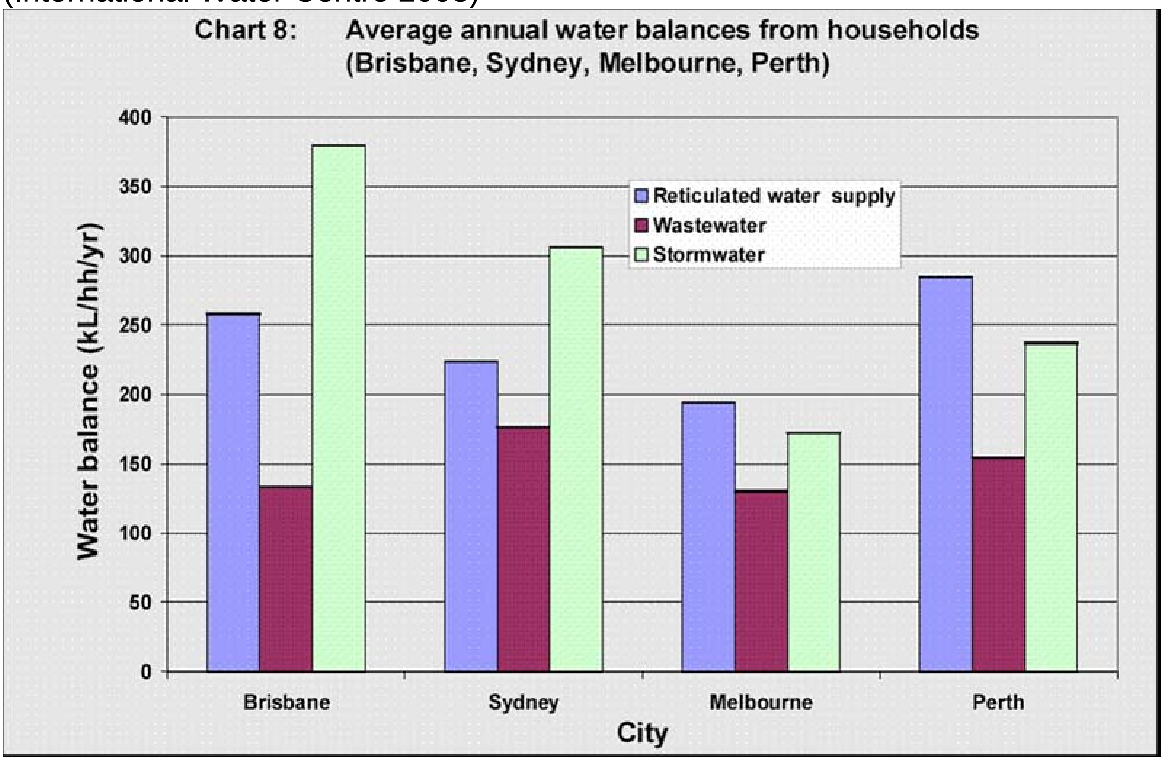
	Demand management	Rain water tanks	Stormwater harvesting	Non-potable recycling	Potable recycling	Desalination	Traveston Crossing Dam
Economics *(Marsden Jacobs The economics of rainwater tanks and alternative water supply options 2007)	*Most cost-effective option	*Highly variable – depending on installation details. Competitive with expensive options like Traveston Crossing Dam and desalination	*Comparable to demand management	*Variable – depending on pipeline and pumping costs	*Variable – depending on pipeline and pumping costs	Less expensive than Traveston Stage 1 when delivery costs are taken into account.	More expensive than desalination when all costs (including long distance pipeline, pumping and treatment) are taken into account
Estuarine and marine impacts	No foreseeable impacts	No foreseeable impacts	Beneficial water quality impacts	Possible reduction of nutrient loads in streams	Possible reduction of nutrient loads in streams	Removal of fresh water yield only from source waters. Local infrastructure impacts (tunnels/ pipes). No change to freshwater, nutrient or sediment inflow regime in estuary	Removal of freshwater yield + evaporation and seepage losses from receiving waters. Disruption of freshwater, nutrient and sediment inflow patterns.
Health Risks	No foreseeable impacts	Possible water quality and mosquito risks from un-maintained tanks	Possible insect risks	Possible risks of cross contamination with potable supply	Possible risks in the case of multiple barrier breakdown. (Needs to be viewed in context of comparison with current water and sewage treatment practices)	No obvious impacts. High quality treated water.	Risks associated with poor water quality – algal toxins, mercury, manganese and other metals. Local health risks from greatly increased mosquito habitat.
Landscape impacts	No impacts	Minor visual impact	May have positive impact on degraded urban landscapes	Minor- associated with works and pipelines.	Minor impacts associated with works and pipelines	Minor impacts associated with works and pipelines. Small land area footprint for treatment plant	Major change to landscape, loss of large area of good quality agricultural land, major riverine ecosystem changes for 200 km downstream.
Irreversibility of impacts	No adverse impacts	Disposal problem of used tanks and pumps.	Storage structures may be difficult to decommission. Not likely to have large scale irreversible impacts	Easy to switch off and/or decommission. May be long term impacts associated with waste stream	Easy to switch off and/or decommission. May be long term impacts associated with waste stream	Easy to switch off and/or decommission. No long-term ecosystem or biodiversity impacts likely.	Difficult to decommission. Large scale and long-term ecosystem and biodiversity impacts may be effectively irreversible

The Way Forward
There is mounting evidence that shows the proposed Traveston Crossing Dam as the most expensive and highest risk of the alternatives for water supply available. These include:

- The analysis of water supply options undertaken by the ISF and Cardno on behalf of the Mary Valley Council of Mayors (Cardno and University of Technology Sydney (2007)).
- The general economic investigation of water supply alternatives undertaken by Marsden Jacobs for the Australian Conservation Foundation and
- Senate Inquiry into the Options for additional water supplies for South East Queensland (Senate Inquiry 2007)

It is recommended that the strategy should include more use of harvesting rainwater where it falls. The potential for storm water harvesting and roof rainwater collection in synergy with waste water recycling schemes in coastal urban areas is also not fully recognized in the draft strategy.

Lost opportunities for rainwater harvesting
Work summarized by the Urban Water Security Research Alliance shows that for Brisbane, the size of rainwater harvesting is far greater than the total water demand, yet only a very small amount of it is utilized. Considering that this is a resource which is available right at the site of demand, without needing to be pumped long distances, it is an obvious part of the Total Water Cycle which presents an enormous opportunity. The size of this underutilized resource is illustrated in the graph below (International Water Centre 2008)



Restore health of rivers by reducing over allocation and extraction (Ecological Sustainable Development principle 4)
An alternative catchment based approach is proposed for water security to achieve a better overall outcome for South East Queensland(SEQ) and the Mary River

catchment. The range of innovative water supply technologies being developed by the State Government are good and offer hope for more sustainable management of water resources in the Mary Catchment and in SEQ in general

However the draft SEQ water strategy did not investigate any alternatives to the proposed inter basin transfer from the Mary Catchment, when the information available to the QWC throughout preparation of the strategy suggests many viable alternatives to this inherently risky and potentially destructive option.

It has failed to provide a truly sustainable and self-reliant strategy for the management of water resources within the Moreton basin itself. It should be used to produce an economically efficient and ecologically sustainable strategy for both the SEQ region and the Mary catchment.

Inter-basin transfer of water resources is an option of last resort, only to be considered after all less risk-prone options have been fully implemented. This is in keeping with current international understanding of ecologically sustainable water development i.e. the 2007 International Declaration on Environmental Flows ("the Brisbane Declaration") and the WWF 2007 paper on Inter Basin transfers in support of this stance.

Even the first stage of this increased inter basin transfer, the extra extraction from Obi Obi Creek via Stage 1 of the Northern Pipeline Interconnector, is predicted to have major adverse environmental impacts on the nationally protected high environmental values of Obi Obi Creek (Technical Advisory Panel appointed to the Water Resource Plan).

The fundamental key is for water that falls on the Mary catchment to stay within the catchment. Instead of diverting the water out of the wet part of the Mary catchment to supply Brisbane, a better option is to allow the water to flow down the Mary catchment to restore flushing flows. This option could provide up to an extra 50000 megalitres/year of water supply for urban growth in the Mary Catchment from water that is currently allocated for diversion out of the Mary Catchment.

Cities on the coast will continue to improve in water use efficiency and could significantly improve in directly harvesting high rainfall available in coastal areas. Desalination plants already identified in the draft SEQ water strategy using renewable energy sources could come on-line in dry times at a cost far lower than the proposed Traveston Crossing Dam. This will have an added advantage of improving water quality in Moreton Bay and produce far less greenhouse gas emissions.

These alternative water supply strategies which consider the out-of-SEQ impacts (of the draft SEQ water strategy) are not currently assessed because the EIS process is falling short of the desires of the wider community. It is clear that constructing the proposed Traveston Crossing Dam, and the associated network of pipelines projects to interconnect the existing storages in the catchment into the SEQ water grid will cumulatively effect the ecological and economic sustainability of the catchment downstream and the Great Sandy Strait Ramsar wetlands. But at present the EIS process assesses each project individually, in total isolation from each other, and the assessment of their cumulative impact is a very minor aspect of the individual assessments. This is a major flaw, which needs to be seriously addressed in the supplementary EIS.

Federal assessment of the proposed Traveston Crossing Dam
It is crucial that the Federal Government provide a thorough independent and realistic assessment in respect of the EPBC Act and Matters of National Environmental Significance, in light of this flawed EIS approach and in respect of Australia's national and international obligations under the United Nations Convention on Biological Diversity, specifically to promote the recovery of threatened species. By definition, these species are already under severe population depletion/extinction pressure and Australia has committed through ratifying the CBD to promoting their recovery. The draft EIS does not provide confidence that this can be achieved.

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