Senate Inquiry Submission - Traveston Dam

Mary River Catchment Coordination Association Inc

April 2007

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1. Introduction

The Mary River Catchment Coordination Association Inc. (MRCCA) presents this publication in response to the Federal Government's announcement to hold a Senate Inquiry involving the examination of all reasonable options for additional water supplies for South East Queensland, including:

a) the merits of all options, including the Queensland Government's proposed Traveston Crossing Dam as well as raising the Borumba Dam: and

(b) the social, environmental, economic and engineering impacts of the various proposals.

The MRCCC seeks to be invited to participate in the Inquiry, which is to be held in Gympie on 17th April, 2007.

2. The Mary River Catchment Coordination Association Inc

The Mary River Catchment Coordination Association is a not for profit community organisation formed in 1993 as a representative body of community, industry and government interests involved in natural resource management in the Mary River Catchment. There are currently 21 Delegates on the Mary River Catchment Coordinating Committee (MRCCC) representing 21 sectors from across the Mary Catchment.

In 1997, the Queensland Government endorsed the Mary Catchment Strategy, which was produced by the MRCCA to provide strategic direction to improve the sustainability of the Mary Catchment. It is conservatively estimated that over $10 million was invested in natural resource management activities implemented as a consequence of the Mary Catchment Strategy.

In 1999 and 2003, the MRCCA won the Queensland Rivercare Award and in 2003 also won the Catchment – Landcare Award. In 2000 the MRCCA prepared Australia's first Catchment Rehabilitation Plan, titled the "Mary River & Tributaries Rehabilitation Plan". Implementation of this plan resulted in the MRCCA winning the National Rivercare Award in 2004.

The Mary River Catchment Coordinating Committee is a vital stakeholder in the Queensland Government's proposal to construct a dam at Traveston Crossing on the Mary River, given our charter is to promote a "sustainable and productive catchment".

The MRCCC has a strong viewpoint that this proposal is seriously flawed, and is underpinned by inadequate rationale particularly in regards to research, planning and governance processes.

Given a proposal of this scale, with its massive impact across the whole of the Mary River catchment and beyond into the Great Sandy Strait and southern Great Barrier Reef, it is inconceivable that there was no community consultation leading up to the Queensland Government's dam proposal announcement – even within the dam footprint.

Coupled with the lack of good governance and transparent decision-making processes, a detailed analysis of alternative water supply and demand options, and debate on the merits of these various water supply alternatives, the MRCCC has no other option but to oppose the construction of this dam.

The MRCCC has produced a publication titled "Water for Future" which outlines the various alternative water supply options that are non-climate influenced and better suited to a long-term solution to the current water crisis, given that climate change is now recognised as reality.

The MRCCC's submission to the Senate Inquiry is focused on the following key areas:

- Effects on threatened species within the Mary River Catchment
- The Mary Basin Water Resource Plan
- The geographic scope of the project, including the current lack of an Environmental Impact Assessment of the Northern Pipeline Interconnector
- Alternatives to building dams – "Water for the Future" paper.

3. The MRCCA summary position in relation to the Traveston Dam

The Mary Catchment Strategy (1997) Position Statement on Future Water Supplies was again ratified at an MRCCC meeting held late last year, when the Committee agreed that all alternatives to water supply for SEQ and the Sunshine Coast's growing population should be thoroughly investigated and exhausted before new dams or weirs within the Mary River Catchment are contemplated, particularly if the dam or weir is primarily to service the future water requirements of south east Queensland to the detriment of the environmental, economic and social fabric of the Mary Catchment. Accordingly, the MRCCC does not support damming the Mary River at Traveston, or at any other location the Queensland Government may subsequently propose.

In brief, the MRCCC has the following concerns in relation to the Traveston Crossing dam proposal:

- No consultation with local government or community preceded the announcement of Traveston Crossing as the site of the proposed dam, and no mention of a mega dam for the Mary Catchment was proposed during the consultation phase for the draft Mary Basin Water Resource Plan. This indicates a lack of strategic direction and planning by the Queensland Government.
- The proposed dam site will displace hundreds of people, and inundate several thousand hectares of good quality agricultural land, including 33 dairy farms, which collectively contribute over $40 Million dollars annually to the local economy.
- Downstream of the proposed dam site in an area already seriously affected by drought, Primary Producers and land managers have grave concerns about their future viability as a result of reduced water entitlements. Upstream of the proposed dam, land managers and Primary Producers face uncertainty over reduced water entitlements during and after the construction period.
- The proposed dam will negatively impact upon threatened species both within the proposed dam area and downstream where environmental flows will be significantly reduced. Two of these species, the endangered Mary River Cod and the endangered Mary River Turtle, occur naturally in the wild nowhere else in the world. A third species, the endangered Queensland Lungfish, now occurs naturally only in the Burnett and Mary river systems. In addition, two endangered frog species, the Giant Barred Frog and the Cascade Tree Frog would both be eliminated from areas proposed to be flooded. All of these species are listed under the EPBC Act 1999 as endangered or vulnerable.
- As freshwater flows are fundamental to marine environments, a dam on the Mary River would have a disastrous effect on the marine environment in the Great Sandy Strait, a RAMSAR listed wetland, and negatively impact on commercial and recreational fishing in the region. The Great Sandy Strait contributes $100 Million annually to the local economy through tourism
- The proposed Traveston dam will not solve south east Queensland's water shortage in the short term. The proposed dam is scheduled to be completed in 2012, and may take many years to fill to capacity. The majority of the dam footprint lies within the Cooloola Shire, which was recently drought declared.
- To our knowledge, there is no publicly available information on the hydrological monitoring, environmental impacts and sustainability of raising of Borumba Dam as an option to supply water to south east Queensland. The MRCCC is therefore unable to comment in this regard.
- At present the geographic scope of the Traveston Crossing Dam referral only includes Stage 1 of the project. However the impact of this proposal is far-reaching and should include the entire catchment of the Mary and its tributaries, the extent of coastal waters influenced by changes in freshwater flows to the Great Sandy Strait and the southern Great Barrier Reef
- In addition the water distribution infrastructure, known as the Northern Pipeline Interconnector, which will link Lake Macdonald, Wappa and Baroon Pocket Dam to the North Pine Dam is not being considered for its impact to the environment. Given that the proposed route of the pipeline interconnector will follow existing utility corridors, of which many of these corridors contain threatened species listed under the EPBC Act, such as the endangered Giant-barred Frog, it is imperative that the Northern Pipeline Interconnector be referred under the Federal EPBC Act for assessment.

The MRCCC is aware that Australia wide, dams are becoming less viable as a water supply option due to lower yields than in previous decades. In 2006, a mini-cyclone hovered off the coast of Brisbane causing flooding and an enormous quantity of run-off (estimates were enough to fill Wivenhoe Dam), yet the catchment dams did not increase during this period. It is estimated that 80% of the capacity of Wivenhoe Dam, Somerset Dam and the other SEQ dams runs off the roofs of houses in Brisbane each year.

Sustainable options for reticulated urban water supply including rainwater tanks, recycling and desalination need to be investigated. Included in this submission is a copy of the ***"Water for the Future"*** publication, produced by the Future Water Options subcommittee of the MRCCC. In this paper, it is demonstrated that recycled water and rainwater tanks could supply over four times the present population of the Caloundra and Maroochy Shires, without the need for construction of a large dam. Using the same principles outlined in this Discussion Paper, south east Queensland could supply more than sufficient recycled water to handle the population increase projected in the SEQ Plan.

4. Traveston Dam impacts upon Endangered and Threatened (EPBC Act) Aquatic Species

The Mary River Catchment is home to several rare and threatened freshwater aquatic species. The proposed dam at Traveston on the main trunk of the Mary River will drastically affect four of these very important species;

- the Mary River Cod (*Maccullochella peelii mariensis* – Endangered under the EPBC Act 1999),
- the Mary River Turtle (*Elusor macrurus* - Endangered EPBC),
- the Queensland Lungfish (*Neoceratodus forsteri* – Vulnerable EPBC) and
- the Giant barred frog (*Mixophyes iteratus* – Endangered EPBC).

The Mary River Cod and the Mary River Turtle occur naturally in the wild nowhere else in the world. The Queensland Lungfish now occurs naturally only in the Burnett and Mary river systems. The proposed large dam at Traveston will negatively impact on all these threatened species, as well as change the balance of aquatic life throughout the river system to the Great Sandy Strait Ramsar listed wetland.

Upstream Effects: -

Fish Passage:

Although the knowledge and technology now exists to build suitable "fish transfer devices" (fish ladders and fish lifts), it is widely acknowledged that they are very difficult and expensive to construct for barriers with high dam walls (such as the proposed dam at Traveston). It is also recognised that, even with a fish transfer device, fish passage, genetic distribution and migration for spawning will never be returned to its natural state after the construction of a dam. This impediment could severely impact on the Mary River Cod and Queensland Lungfish (both of which are known to migrate over long distances, especially during spawning times). Recent electronic tracking studies have established that turtles do not enter fish transfer devices. This dam would also impede the flow of genetic material between upstream and downstream populations of the Giant barred frog as it will disappear from most of the impoundment perimeter.

Flooding of Existing Habitat:

The proposed dam site contains known habitat for the nationally endangered Mary River Cod, Queensland Lungfish and Mary River Turtle. Although these species can survive within impounded areas, they cannot breed in these impounded areas. The Mary River Cod relies on deep, cool, shaded pools containing large woody debris (snags) for it to successfully breed. The Traveston dam will flood several of these known habitats on the Mary River and will not provide any similar habitat once completed.

Queensland Lungfish require shallow flowing riffles and dense beds of submerged aquatic plants to lay their eggs on. Suitable lungfish spawning habitat will therefore not exist within the new dam.

The Mary River Turtle utilises only sandy river banks to lay its eggs. The proposed dam will flood several known locations of critical nesting habitat of this rare species.

It is also believed that poor water quality resulting from a process in dams known as stratification (where deep, cooler waters with little dissolved oxygen turn over when surface waters heat up) will also have dire effect on any Mary River Cod, Mary River Turtle or Queensland Lungfish that may survive within the dammed area.

The Giant barred frog is found in the tributaries of the Mary River where undercut banks, vegetation and deep pools are present. If the lower sections of many tributaries are flooded, riparian vegetation will be lost. Undercut banks are essential for egg deposition and these too will be lost. The frogs will disappear from the impounded areas.

Aquatic Weed and Algal Growth:

The Traveston dam site will create a large expanse of relatively shallow still water, where the lack of flow, increased water temperature and stratification will create optimal growing conditions for aquatic weeds and algae. Excessive aquatic weed and algal growth create very unfavourable conditions for aquatic life (such as the Mary Cod, Lungfish and Mary River Turtle) in still water bodies by severely depleting the dissolved oxygen levels within the water. There are many sources of aquatic weeds already in the Mary Catchment (for example Cabomba, a weed of national significance, in nearby Lake McDonald) that will be very easily spread to the proposed dam. Once established in the dam these aquatic weeds and associated problems will be very easily transported downstream.

Exotic Fish Species:

It is well documented that an impounded dam environment is far more suited to many exotic fish species, such as Carp and Talapia. The Mary River is one of the few remaining rivers in South East Queensland without an infestation of large exotic fish. If exotic fish species entered the proposed dam, they could be expected to proliferate in a short period of time and out compete any remaining native fish species (such as the Mary River Cod and Queensland Lungfish). Some exotic fish are known to predate on frog eggs and tadpoles and would add to the pressures on Giant barred frog populations living along tributaries of the Mary River. There would be a high risk of exotic fish species spreading both up and downstream of the proposed impounded area.

Downstream Effects: -

Reduction in Flow:

It is estimated that the mean annual flow of the Mary River will be reduced by up to 20 percent as a result of the proposed dam. There are studies that have directly linked the decline in the health and productivity of fish species to a reduction in flow volumes. Reduced flows would negatively effect populations of the Mary River Cod and Queensland Lungfish and other native aquatic species.

The proposed Traveston Crossing dam will severely impact upon the environmental flows entering the estuary of the Mary River in the Great Sandy Strait, a sand passage estuary between the mainland and the World Heritage-listed Fraser Island in South-east Queensland. The Mary River estuary and the Great Sandy Strait were listed as a Ramsar wetland in 1999. The Great Sandy Strait is an exceptionally important feeding ground for migratory shorebirds and important for a wide range of other shorebirds, waterfowl and seabirds, marine fish, crustaceans, oysters, dugong, sea turtles and dolphins, and supports a significant commercial and recreational fishing industry. Freshwater flows also help support marine fish production as many marine fish spawn in the Mary River estuary and Great Sandy Strait.

The Traveston Crossing Dam proposal is likely to have significant impacts on Matters of National Environmental Significance all the way to the Great Sandy Strait Ramsar wetlands and beyond. A decrease in freshwater flow and nutrients due to dam construction will affect the nursery areas in a number of ways, including increasing salinity, allowing predatory marine fish to invade, and reducing the available food supply.

Currently it is unknown how the management of the Mary River Barrage downstream of Tiaro meets environmental flow requirements. This is because flow does not appear to be accurately measured and as a consequence the environmental flows at the mouth of the river cannot be accurately measured. This problem will be substantially magnified if the Traveston Crossing Dam is allowed to proceed.

Loss of Riffles and Pools:

The combined effect the proposed dam will have of reduced mean annual flow and the loss of channel forming high flows will dramatically change the shape of the Mary River downstream of the dam. The major impact expected from the change in flows will be the loss of the riffles (shallow water rapids) and pools along the Mary River. Riffles and pools are essential habitat for the Mary River Cod and Queensland Lungfish, with the Cod relying on deep shaded pools to breed and spawn in and the Lungfish needing riffles with aquatic plants to lay their eggs on. Riffles also provide the river with dissolved oxygen through aeration of the water. A loss of riffles

will mean a reduction in the dissolved oxygen levels directly affecting the Mary River Cod, Queensland Lungfish and Mary River Turtle. Riffles are also very important breeding areas and habitat for many species of macroinvertebrates (waterbugs), which are a very important food source for the Mary River Cod, Queensland Lungfish and Mary River Turtle.

Channel Contraction:

The lack of high flows that will result from the proposed dam, will also result in channel contraction and bed scouring downstream of the dam. As the channel contracts and the bed deepens, vegetation will likely begin to encroach further towards the river. The Mary River Turtle uses the sandy banks of the Mary River to lay its eggs and, as the vegetation encroaches into the contracting river channel, these important sandy banks will be lost to the Mary River turtle, making reproduction impossible.

Loss of Floodplain Connectivity:

The decrease in high flows downstream of the proposed dam will mean less events where the floodwaters breach the high banks of the Mary River. The breaching of these high banks is very important to many aquatic species that rely on an interaction between the river waters and the water of off-stream wetlands.

Loss of Epiphytic Algae and Phytoplankton:

The changes in flow caused by the proposed dam, especially release of water during normally low flow periods, will cause flushing of the natural epiphytic (attached) algae and phytoplankton that are an essential component of the food chain and important for juvenile Mary River Cod and Queensland Lungfish.

Sedimentation During Construction:

The construction of the proposed dam will undoubtedly cause a large increase in sediment entering the Mary River. This will increase the river's turbidity downstream of the proposed dam site, and directly affect the health of the Mary River Cod, Queensland Lungfish and Mary River Turtle, through decreased water quality, decreased native submerged aquatic plant growth and infilling of habitat pools.

Decrease in Large Woody Debris:

The proposed dam will create a barrier to the transport of large woody debris downstream of the dam. Large woody debris is essential for the spawning and refuge of the Mary River Cod and habitat for the Queensland Lungfish and Mary River Turtle.

Release of Cold & Deoxygenated Water:

If water releases from the proposed dam are not managed correctly and multi-levelled releases are not incorporated into dam operations there will be impacts on the Mary Cod, Queensland Lungfish and Mary River Turtle through thermal pollution and decreased dissolved oxygen levels. Water is often released from the bottom of a dam, where the water has a much lower temperature, and lower dissolved oxygen levels. Many studies have shown that cold water releases can be detrimental to many aquatic species spawning and life cycles (such as the Mary River Cod and Queensland Lungfish) and disrupt the availability of food throughout the food chain.

Decreased Riparian Seed Dispersal:

The reduction in flows caused by the proposed dam may also decrease the natural ability of the Mary River to disperse very important creek-side (riparian) tree species (such as the Weeping Lilly Pilly). These tree species are essential in maintaining cool water temperatures and providing large woody debris essential habitat elements for the Mary River Cod.

Tributary Channel Incision:

It is probable that the decreased flows caused by the proposed dam will cause channel incision (or stream bed erosion) as the normal flow of the tributaries enter the lower flows of the Mary River. Channel incision of the tributaries entering the Mary River will alter the habitats of the Mary River Cod, Mary River Turtle and Queensland Lungfish within these tributaries.

Increased Aquatic Weeds and Algal Growth:

The stable base flows and reduced incidence of flood flow created by the proposed dams will create far more favourable conditions for aquatic weeds invasions and algal growth. As already mentioned, excessive aquatic weeds and algal growth create very unfavourable conditions for aquatic life (such as the Mary Cod, Lungfish and Mary River Turtle) in Stillwater bodies by severely depleting the dissolved oxygen levels within the water. With

a very high likelihood that aquatic weeds and algal growth will become a problem in the impounded water above the dam wall, it is likely that the problems will be transferred downstream.

Mortality from Spillway:

Sudden falls in water levels, caused by dam operation procedures, can cause fish stranding on and below spillways. There are also many reported cases of fish and turtles dying after being washed over dam spillways during high flows. The Mary River Cod, Queensland Lungfish and Mary River Turtle are very susceptible to this threat.

5. The Queensland Government's Mary Basin Water Resource Plan

The MRCCC is very concerned about the lack of process with the finalisation of the Mary Basin Water Resource Plan (WRP). A number of MRCCC Delegates were heavily involved in community consultation for the formulation of the draft WRP initially through the Sector Representation Groups (SRG) and then the Ministerial-appointed Community Reference Panel (CRP).

The draft WRP was released for comment in November 2005. In this draft document there was no mention of Traveston Crossing Dam, and this dam was never foreshadowed in any of the SRG or CRP meetings held. There was mention of a small regulating weir at Coles Crossing. The draft WRP did make mention of a 'strategic reserve' but there was no figure attached to this reserve of unallocated water from the Mary Basin.

The final WRP was released in September 2006, with massive changes made from the draft document. These changes were not reflective of the comments received from the public – as outlined in the consultation report prepared for the Final WRP.

The most significant change to the Final WRP was the 'watering down' of the environmental flow obligations to, in some cases, unprecedented low flow levels. The current WRP simply indicates what should happen, but 'if we can't do it, we don't have to". By comparison the draft WRP was quite stringent in its environmental flow requirements.

The tables and information on the following page shows the dramatic effect the Final WRP & Traveston Crossing Dam will have on the no flow durations, low flows and medium to high flows of the Mary River. It also shows how vastly different the draft WRP compares to Final WRP. As the dam represents a major departure from the intent of the draft WRP, the State Government is open to criticism it has unfairly used the final WRP for its own intentions, regardless of the point-of-view of the community. This type of conduct is highly deceptive and grossly misleading.

The Community Reference Panel, appointed by the State Government to provide input into the WRP has publicly advised that it had been profoundly deceived by the State Government in relation to the proposed dam at Traveston Crossing.

Further analysis of the Final Mary Basin WRP with the then draft Moreton Basin WRP shows massive disparities between the levels of protection afforded to the estuaries of each WRP basin.

In the Final Mary Basin WRP there is no mention made of special ecological requirements for the Ramsar-listed Great Sandy Strait, however in the draft Moreton WRP there is a specific section that details the special ecological values of Moreton Bay, and that special flow requirements are required to ensure the integrity of these values in Moreton Bay.

During 2006, the MRCCC's water quality monitoring program sampled electrical conductivity (surface water salinity levels) of several sites along the Mary River downstream of Gympie during a period when the river actually stopped flowing. Consistently high EC levels that did not comply with Queensland Water Quality Objectives guidelines were recorded. This occurrence gives an indication of the potential for serious changes to the salinity level of the river downstream of Gympie after only a few days no flow. However, the Queensland Government's Mary Basin Water Resource Plan allows upwards of 6 months of no flow downstream of Gympie.

No Flow Duration from the Final Mary WRP (averaged over the next 110 years)

Node	Up to 3 months	3 – 6 months	6- 9 months	Over 9 months
Mary River mouth	30 times	1 time	0	0
Home Park (Tiaro)	13 times	5 times	0	0
Fishermans Pocket (Gympie)	18 times	3 times	0	0

- The final Mary Basin WRP now allows there to be 30 times when there is no flow at the Mary River mouth for upwards of 3 months averaged over the next 110 years – this is the equivalent of 7.5 years of no flow at the river mouth (averaged over 110 years).
- The final Mary Basin WRP now allows there to be 18 times when there is no flow at Fishermans Pocket (Gympie) for upwards of 3 months averaged over the next 110 years.
    - the equivalent of 4.5 years (in total) of no flow at Fishermans Pocket averaged over 110 years.
    - In 10 years this is the equivalent of nearly two no flow events for upwards of 3 months.

Low Flows (less than 1 megalitre per day)
Percentage of the time averaged over the next 110 years

Node	Draft WRP	Final WRP
Mary River mouth	18%	31% (34 years)
Home Park (Tiaro)	18%	18% (20 years)
Fishermans Pocket (Gympie)	18%	18% (20 years)

- The low flows (less than 1 megalitre per day) almost doubled at the Mary River mouth from the draft WRP and the final WRP.
- The low flows (less than 1 megalitre per day) for Fishermans Pocket did not alter between the draft WRP and final WRP.

Medium to High Flow objectives

Node	Mean Annual Flow (%)	% of 1:2-3 year floods taken from river		% of 1:5 year floods taken from river		% of 1:20 year floods taken from river	
	FINAL	DRAFT	FINAL	DRAFT	FINAL	DRAFT	FINAL
Mary River mouth	85	17	17	5	11	24	31
Home Park (Tiaro)	79	21	28	14	31	26	31
Fishermans Pocket (Gympie)	70	32	58	24	31	15	31

n.b. there is no means possible to measure water quantity at the Mary River mouth

- The small freshes (floods every 2-3 years) will be cut by 58% at Fishermans Pocket, Gympie – nearly double the draft WRP at 32%.
- The 1 in 20 year floods will be cut by 31% at Fishermans Pocket, Gympie – more than doubling from the draft WRP.
- The 1 in 5 year floods will be cut by 31% at Home Park, Tiaro – more than doubling from the draft WRP

* The above information is from the Final Water Resource (Mary Basin) Plan Sub-ordinate Legislation No.192, 2006.

6. Comments on the Coordinator General's Draft Terms of Reference for an Environmental Impact Statement for the Traveston Crossing Dam Project: Stage 1

After reviewing the draft Terms of Reference (ToR) the MRCCA had some concerns about the comprehensiveness of the ToR. The MRCCA believes a comprehensive and accurate EIS will only be produced if every single section and point within the draft ToR is addressed to its fullest.

However the MRCCA also believes that some key considerations need to be addressed in the ToR to ensure a full assessment of the impact of the proposal. Below are some of the key recommendations made to the Coordinator General to be considered before the final ToR was to be released:

1. The EIS does not include Stage 2 of the proposed Traveston Crossing Dam. Only Stage 1 of the proposed dam has been referred to the Federal Environment, yet the State Government is currently purchasing Stage 1 and Stage 2 land, and intends to build the dam wall to the full height. This is not acceptable. It is essential that the ToR project area be extended to also include Stage 2.

2. A comprehensive cost-benefit analysis should be prepared, and the ToR should specifically detail the aspects that will be investigated. At present section 1.3.2 *Costs and Benefits of the Project* on page 17, is extremely limited in detail, and only contains 2 dot-points of minimal description. At the very least the economic multipliers lost to the local and regional economies and the viability of enterprises assessed with loss of throughput should be investigated, The loss of economic benefit derived from ecosystem functions and ecosystem services currently provided needs to be investigated through techniques such as Contingency Valuation Analysis. Included in this analysis should be the full cost assessment and like comparison of all water resource options available to supply 70,000Ml per year (as stage 2 is unlikely to be constructed until 2035 [if at all] according to QWIPL factsheet – Project Overview).

3. Climate change scenarios should be included in the analysis for hydrology, floods, rainfall and temperature and evaporation rates which will impinge upon the reliability of the yield generated by the dam and on downstream flows. This most relates to section *1.3.1 Need for the Project, 2.2.5 Proposed Water Storage Operation, 3.5.1 Water Resources – Hydrology*

4. Section "3.5.1 Water Resources – Hydrology" of the draft TOR asks the EIS to describe the environmental values of the existing water resources that may be affected by the Project in the context of environmental values defined in such documents as the EP Act, Environmental Protection (Water) Policy and ANZECC 2000. Section 3.5.1 then asks the EIS to describe the potential impacts and mitigation measures of the project. Within in this section the TOR only requires reference be made to the Mary River Basin Water Resource Plan (also page 46, dot point 9 refers to the Mary WRP). The contradictions between the Mary WRP and the Environmental Protection (Water) Policy and ANZECC 2000 must be noted.

   The EP (Water) Policy 1997 states that when developing plans the Chief Executive must consider the ecological values of the waters, the environmental water requirements, and the protection of the environment in future water allocation decisions. The Mary WRP's ecological outcomes state the water resource allocation and operation in the Mary River Catchment needs only to "minimise changes" to the existing flow regime and "minimise changes" to the hydraulic habitat requirements of the plan areas existing ecological assets. There is a stark difference between "protecting the environment" and "minimising changes".

The Queensland Water Plan 2005 to 2010 under Strategy 1, Action 1.1 goes further and states that a "secure allocation should be provided to the environment, and that this allocation must be sufficient to maintain the ecological health of aquatic ecosystems and the plants and animals that depend on them, through taking into account river flow regimes-such as volume, timing, seasonality and duration". The "Mary WRP Environmental Flow Assessment Framework and Scenario Implications", June 2005, investigates the possible effects several different scenarios of flow regimes may have on the ecology of the Mary River basin. This report was prepared before the final Mary WRP was released. The scenario best describing the final version of the Mary WRP is scenario is R2 – a single large dam on the Mary River Upstream of Gympie (however Traveston Crossing Dam is a much larger proposal than scenario R2). To summarise the findings of this report it was concluded that of the four scenarios for the Mary River Catchment, the R2 scenario would cause the most change from reference condition, and thus overall condition degradation to the Mary River Catchment. With this in mind it is highly debateable whether the Mary WRP meets the requirements of the Queensland Water Plan or EP Water Policy.

The ANZECC 2000 Guidelines (Chapter 8.2.1.8) states the importance of the establishment of appropriate flow regimes to sustain the ecological values of river. ANZECC 2000 Guidelines recommends six types of methods for obtaining environmental flow regimes for Australian waterways: -

- the Range of variability method,
- Habitat assessment methods,
- Expert panel methods,
- Building block methodology,
- Ecological/holistic approaches and
- Decision support systems.

It is apparent that only the expert panel process was used to assess the environmental flow conditions for the Mary WRP. But the advice provided by the expert panel to DNRM was that a large single dam on the main Mary River above Gympie would be disastrous for endangered aquatic species and their ecosystem functioning and the catchment itself (reference R2 scenario of the Mary WRP). It is also worth noting that the R2 scenario provided to the expert panel (TAP) was of considerably less scale than that proposed for Traveston Crossing Dam.

Considering these points it is apparent that the Mary WRP does not comply with many sections of the above mentioned documents. The Mary WRP is also not endorsed by the community, as there was an immense change in the contents of the WRP between the draft for community comment and final version for legislation. This rewrite allowed much greater adverse impacts on the river in terms of environmental flow schedules following the political announcement of the Traveston Crossing dam.

The above points are just some of the major flaws of the Mary WRP, and in view of these we would like to request that all reference to the Mary WRP be removed from the final TOR.

5. The WRP, in its current form, cannot provide adequate protection of aquatic ecosystems protected by the EPBC Act or irrigation water allocations). There is currently no requirement for compliance of environmental flow schedules (contained in the WRP) for the freshwater sections downstream of the proposed dam wall. Therefore the EIS should specify locations in the catchment where the proposal will have the greatest effect on EPBC Matters of National

Significance. These areas need to be a focus of thorough investigation. At present the nodes of the river most at risk of degradation are:

- From the dam wall to Six Mile Creek
- Mary River barrage
- Mary River estuary

The hydrological impact on these nodes needs to be properly assessed to determine the effects to the aquatic ecosystems and very strict environmental flow objectives developed which are set in legislation.

6. Hydrology modelling which will be used in *Section 3.5.1 Hydrology*, should be performed using only the previous 10 years (1996 – 2006) of flow data which provides a better indication of the current effect of climate change. Using an average of the flows from a 110 year period (from 1890 – 1999) is flawed given that the current climatic conditions experienced are very different to previous decades, and that future predictions are for reduced rainfall. As a consequence we request that the IQQM hydrology modelling used in the Final Mary Basin WRP be re-modelled using only the previous 10 years hydrology data for the EIS.

7. The ToR refers to the "Project footprint" or "Project area" throughout the text. The "project area" must be defined as:
    a. the flooded zone of the dam,
    b. the upstream sections of the Mary River and tributaries (likely to be affected by reduced water entitlements and land-use conditions),
    c. the downstream freshwater section of the Mary River(also likely to be affected by reduced water entitlements and land-use conditions),
    d. the Great Sandy Strait and estuarine areas within the Ramsar wetland effected and
    e. the land that will be effected by the proposed pipeline to appropriate water from the Mary River Catchment to Brisbane.

8. The social and economic impact of the Traveston Crossing Dam proposal requires a great deal more emphasis and should be strengthened in the ToR. The biophysical impacts to the catchment will only occur if Traveston Crossing Dam is constructed. However the announcement of the Traveston Crossing Dam has had a major impact on the motivation of the community. At present there is a major loss of momentum by the catchment community to implement sustainable NRM outcomes, which will have a long-term flow-on effects for the condition of the catchment. Therefore it is recommended that a serious assessment of the loss of momentum for NRM activities, and the loss of NRM 'champions', as a consequence of the dam announcement be performed. Secondly, an analysis of the long-term flow-on effect of achieving sustainable NRM outcomes in the Mary Catchment should be performed, and recommendations provided to re-gain this loss of community momentum

9. Further investigation is required for Section 1.4 'Alternatives to the project'. At present this section is very limited in scope. Recently the Mary Council of Mayors commissioned Cardno and UTS to investigate alternative water supply sources for South-east Queensland. The outcome of this investigation was that the Traveston Crossing Dam is not required. The study found existing water supply options, combined with non-climate influenced water sources, negate the need for Traveston Crossing Dam. Therefore it is recommended the final ToR includes the outcomes of this study in the alternatives section (Section 1.4) and the cost / benefit analysis (1.3.2) section. The MRCCA also requests the Coordinator General carefully considers the findings of the Mary Council of Mayors report.

10. The timeframe for the preparation of the EIS is 6 months according to the Qld Government, which is fundamentally flawed. The draft TOR gives no indication of timeframes for the preparation of the EIS. A 6-month timeframe does not encompass one complete seasonal cycle. This is not an appropriate amount of time to identify and quantify potential habitat loss, and the consequential risk of extinction to the EVR fauna. This timeframe cannot measure seasonality as it relates to biodiversity assessment. The proposed timeframe is also inadequate to conduct detailed studies required to quantify the interactions between surface waters and the groundwaters, which is not covered in the WRP. The length of time for EIS preparation (as advertised by the Queensland Government) should be extended to at least 24 months (to obtain 2 seasons data) as a matter of urgency. In particular, this current season is a particularly bad season for determining the presence of frog populations due the dry conditions. As a consequence many frogs species are not calling, making their detection very difficult. This issue most relates to Section 3.3 Nature Conservation in the draft ToR.

11. The ToR should specify costs associated with the project. Clear articulation of cost breakdown between projects needs to be undertaken for:
    a. Dam construction.
    b. Infrastructure, i.e. pipelines, water treatment plants, pumping stations etc.
    c. Compensation for effected upstream and downstream users.
    d. Road, electricity, communication, railway relocation.
    e. Property purchase.
    f. Plan redrafting costs (LG Planning Schemes, Regional NRM Plans, etc).
    g. Ongoing maintenance costs of all options including aquatic weed management, blue-green algae and vector control.
    h. Water treatment costs of water extracted from the dam in light of a catchment with high sediment loads and many known contaminated sites.
    i. Water treatment cost impacts for downstream users (Councils) due to the likelihood of higher pollutant loads in the water.
    j. Ecosystem service costs for loss of significant areas of remnant vegetation.
    k. Remnant vegetation offset costs for reestablishment.
    l. Industry costs including economic evaluation of the loss of good quality agricultural land, losses to the fisheries industry and associated tourism impacts down stream.
    m. Engineering works for necessary infrastructure (eg bridges) downstream that are affected by future bank instability associated with reduction in water flows.
    n. Bank stabilisation costs for downstream areas.
    o. Costs of managing sediment load within dam and costs for managing/reducing sediment entry into dam.
    p. Cost of land use change within the controlled catchment area above dam.
    q. Costs of offsetting the significant greenhouse gas emissions caused by the construction and operation of the dam.

12. The TOR should require assessment of the potential for hyper salinity levels to occur in the marine ecosystems of Hervey Bay due to reduced river flow. An assessment of the effect of hyper salinity on coastline coral ecosystems should be included in the TOR.

13. The Paradise Dam fish-lift design has been suggested as the design to allow fish passage (in particular Lungfish) across the Traveston Crossing Dam. However MRCCA requests that a comprehensive investigation into the effective operation of the Paradise Dam fish-lift, and its ability to transfer fish (in particular Lungfish) safely upstream and downstream be carried out. A

full investigation into the effect of the fish lift on turtle mortality is necessary given that the dam wall will be constructed in known endangered Mary River Turtle habitat.

14. The EIS should contain a demonstrated program of implementation of mitigation measures with consequences for non-implementation and fully documented performance criteria. It is evident that such a program was not put in place for the Paradise Dam and many of the proposed mitigation measures either do not work or have not been implemented.

15. Within section 3.2.1 Land Use and Infrastructure (p.29 & p.30) there contains references to land-use restrictions with respect to maintaining the water quality of Traveston Crossing Dam. Contained within the Water Act 2000 the State Government has the option of creating a 'declared catchment' whereby land-use restrictions are placed upon the property owners upstream of a water supply. The references to land-use restrictions contained on p.29 & p.30 would indicate that the intention is to declare the Traveston Crossing Dam catchment. Therefore if this is the case, the ToR should provide comprehensive details of extent of the catchment above the proposed dam that will be declared, and the timing of the declaration (i.e. during construction, or on completion of Stage 1 etc). It would also be prudent for the ToR to detail the level of restriction that will be placed upon the catchment above the proposed dam, given that the Water Act 2000 clearly states riparian protection buffer widths for declared catchments. The MRCCA promotes voluntary uptake of sustainable riparian zone management, and water quality improvement.

The MRCCC is yet to receive any conformation of receipt for our comments provided to the Coordinator General regarding the ToR.

7. Water for the Future Discussion Paper

Introduction

The Mary River Catchment Coordinating Committee (MRCCC) aims to stimulate debate on long term, sustainable water supply strategies and highlight that water is a finite resource, which needs to be carefully managed. Unless major changes are implemented in the way water is managed, competition between urban water users and irrigators will intensify in the Mary Basin. The community needs to be aware that there are alternatives to building more dams.

This document provides information on sustainable options for reticulated urban water supply including rainwater tanks, recycling and desalination.

The Mary Basin incorporates the whole of the Mary Catchment from Maleny to Hervey Bay, the Sunshine Coast catchments (Mooloolah, Maroochy and Noosa), the Burrum River catchment, and the Cooloola Coast (Rainbow Beach and Tin Can Bay).

Recent figures compiled by the MRCCC show that the current population of the Mary Basin is close to 400,000. Some of the towns in this region are among the fastest growth-rate localities in Queensland. Projections by the Department of Local Government and Planning indicate the population of this region will double in 20 years. This growth is already placing significant pressures on the catchment's natural resources and the provision of community services.

The MRCCC is dedicated to achieving a sustainable and productive catchment. In achieving this vision, our members hope to ensure that we will not be judged by what we take from the catchment, but by how we leave the catchment so that it's capacity to support our future generations is enhanced.

Mary River Catchment Coordinating Committee

PO Box 1027, Gympie 4570

Phone: 07 5482 4766

Fax: 07 5482 5642

Email: mrccc@ozwide.net.au

Website: www.wb2020.qld.gov.au/icm/mrccc

Dams are letting us down.
We are polluting our rivers & wasting our resources

Water supply sources

- dams and weirs provide most of the water supplied for urban use on the Sunshine Coast
- their catchments are unprotected
- groundwater is not a major contributor
- little is known about groundwater

Water Treatment Plant

- water is treated so that it is safe to drink
- amount of treatment required (and cost) depends on raw water quality
- risk should be identified and managed
- technology is available to treat water of any quality to virtually pure

Water at work

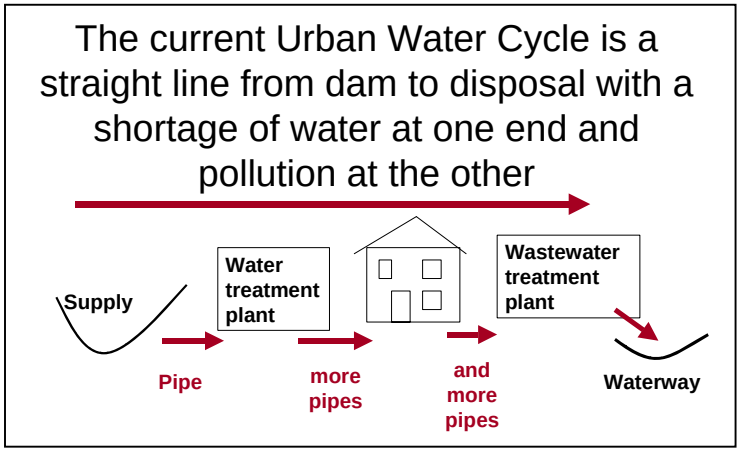
- drinking water is used in industry, institutions and in our homes where half is used inside the house and half outside
- only 1% of the drinking quality water we are supplied with is consumed

Demand management

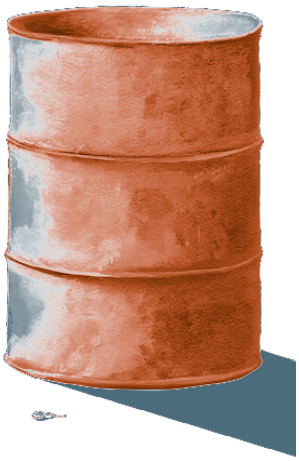
- demand management is a cost effective way of making existing water supplies go further
- more efficient appliances are needed - changes to community behaviour are difficult to maintain
- it can provide "breathing space" but will not be sufficient to provide for projected populations in the longer term

Demand management includes:

- WaterWise programs and education
- unaccounted-for water and leakage reduction
- pricing incentives
- restrictions
- water-efficient appliances
- pressure management



Wastewater management



- wastewater contains one tablespoonful of dirt in a 44 gallon drum of water
- it is treated to separate the water (effluent) from the dirt (biosolids)
- the amount of treatment depends on how the effluent is to be managed
- effluent is disposed of in a waterway or the ocean in accordance with an EPA licence
- EPA licences are becoming more rigorous
- pollutants of concern to the receiving environment are carbon containing chemicals and nutrients

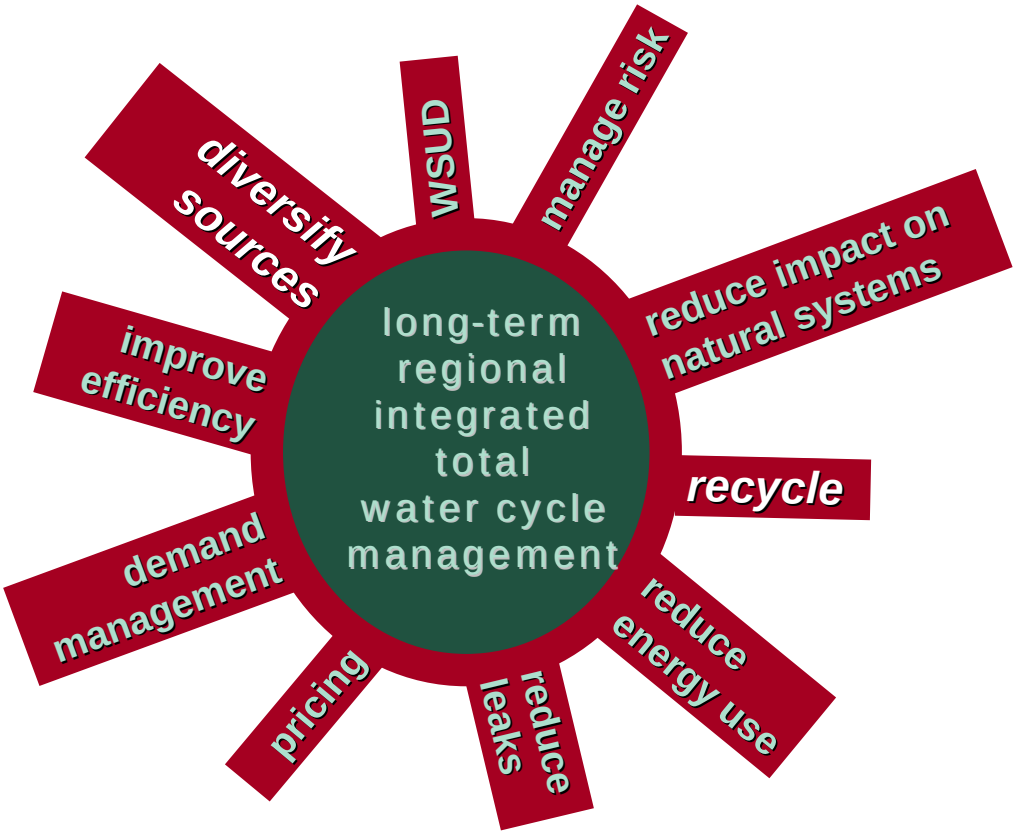
Senate Inquiry into Urban Water Management 2002

- we do not use water sustainably
- we know we have to change
- we have the technology and expertise

but we are not doing it !

Sustainable urban water management involves:

- quality fit-for-purpose - safeguarding public health
- the security of a diversity of sources
- water-use efficiency
- reducing impact of waste discharge
- reducing energy use



Water supply options

- dams
- rainwater tanks
- desalination
- recycled water

Dams

- dams have been a traditional strategy to cope with our unpredictable and uncertain climate – but they are letting us down
- are a barrier to the flow of water, sediments, oxygen and energy
- inundate good agricultural land
- have social and cultural impacts
- change a river's hydrology
- the best dam sites have already been developed
- new sites are in lower rainfall areas and further from where the water is needed
- yield of dams is less than previously thought due to environmental flow requirements and lower rainfall
- building a dam doesn't make it rain
- an advantage of dams is that they are a "short term" political fix
- some dams provide a source of power, flood mitigation and recreational opportunities

Rainwater tanks

- If rainwater is the only source of quality water, the bigger the rainwater tank, the better – limited only by the size of the roof catchment and rainfall
- If a trickle-top-up system is used, models are available to work our the optimum size.

Advantages of rainwater tanks

- tanks in coastal urban towns are generally in a higher rainfall area than more inland dams
- they fill from small and medium rain events as opposed to dams that require larger events before run-off into the dam is significant especially after a dry spell

Optimum use of rainwater tanks

- they must be used constantly and regularly – not just on the garden
- studies on the Gold Coast show 25 – 30% of household demand can be provided by a 10,000 litre tank with a trickle top-up system

Rainwater tank size

Choice of tank size is determined by a number of factors:

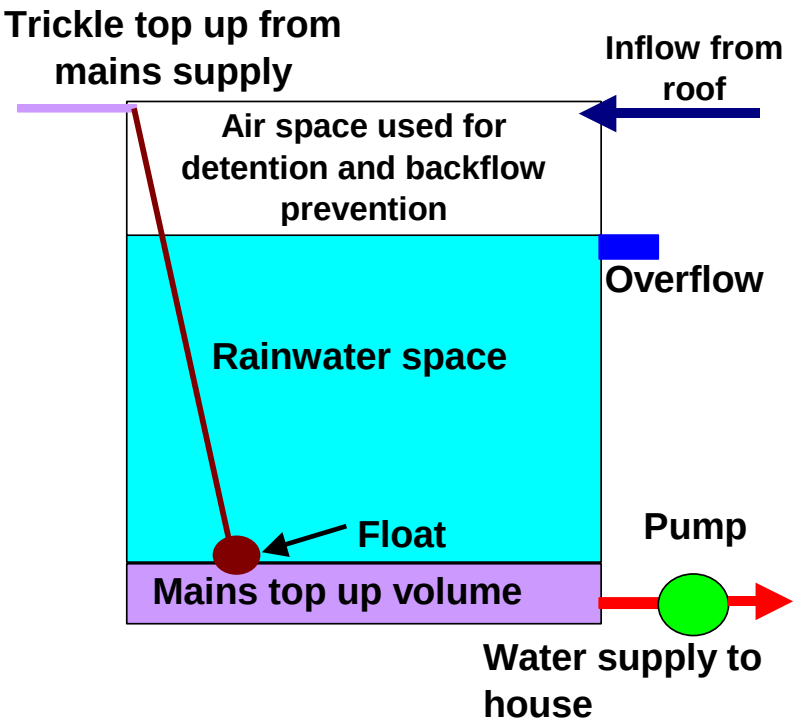
- the volume of water required each day
- the rainfall
- the size of the roof
- the security of supply required – if there is a prolonged drought the amount of water stored in the tank may not be sufficient to avoid buying water

There is a point at which additional increases in tank capacity will have only a marginal effect on yield but significantly increase cost.

The size of the tank you will need depends on your roof area, rainfall, how much water you use each day and whether you are prepared to buy water if you run out.

This table shows the tank sizes required to provide 99% security of supply

Volume required (l/d)	Annual rainfall (mm)	Roof area (m^2)						
		100	150	200	300	400	500	600
		Minimum tank size (kl)						
100	200						*40*	
	300				*20*	*17*		
	600	*19*	*12*	*10*	*8*			
	1200	*10*	*8*	*7*				
200	300							*47*
	600			*36*	*26*	*22*	*20*	*18*
	1200	*34*	*24*	*19*	*16*	*14*		
400	500							*51*
	600							*47*
	1200				*47*	*39*	*34*	*31*



The Trickle Top-up system (Diagram courtesy of Dr Peter Coombes)

The trickle 'top up' system

- the tank is topped up by a low flow from the mains when water levels in the tank are low
- the tank tops up to a minimum level until rainfall fills the tank again
- mains supply
- the tank water is used for toilet flushing, the hot water service and outside uses
- a second pipe provides water for drinking
- the constant flow takes the daily peaks out of household demand enabling cost savings at the water treatment plant and the use of smaller pipes

Disadvantages of rainwater tanks

- microbiological quality is not as high as reticulated water
- potential to be a breeding place for mosquitoes
- regular maintenance and cleaning required
- profits of the water providers reduced

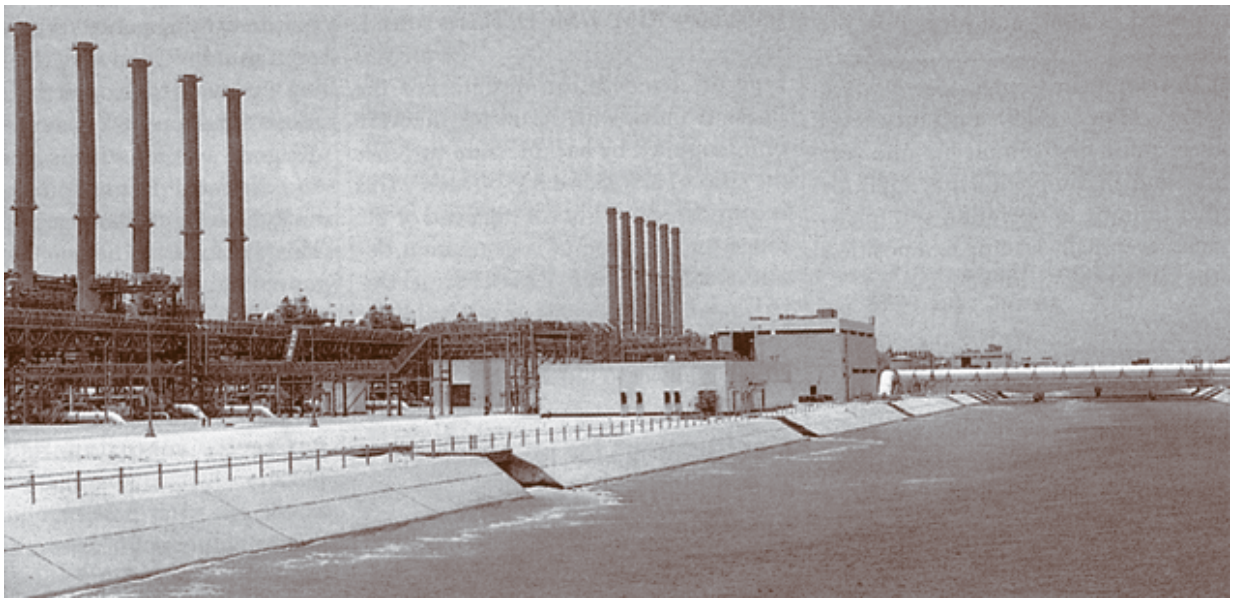
To find out more about rainwater tanks, visit this website:

http://www.dhs.sa.gov.au/pehs/publications/monograph-rainwater.pdf.

Desalination

- fresh water can be recovered from seawater using “multi-stage flash” or membrane technology
- multi-stage flash is used mainly in the Middle East where there is an abundant quantity of energy from oil

The Al-Jubail "multi stage flash” desalination plant in Saudi Arabia is the largest in the world



Desalination – reverse osmosis

- reverse osmosis membranes produce water that is virtually “pure”
- they require a lot of energy and the waste stream is expensive and difficult to manage
- membrane technology has advanced over the last decade. The cost of production has fallen
- the same technology can be used to reclaim wastewater

The reverse osmosis desalination plant at West Basin in California produces 10 mega litres of water daily for use in an oil refinery

Recycled water

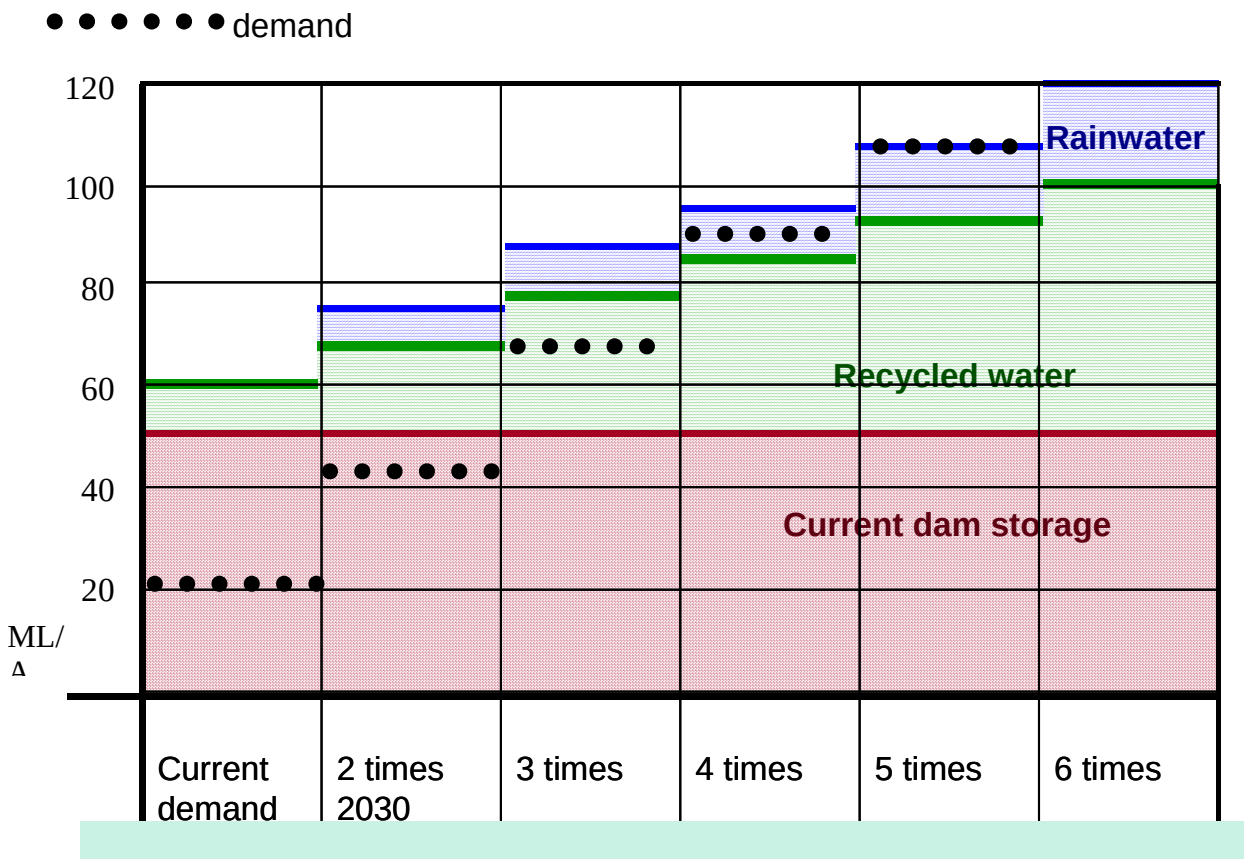
- the water we use inside our homes (50% of demand) goes to a wastewater treatment plant where it becomes available for recycling
- water available for recycling increases with population
- a recovery rate of 70 – 80% is technically feasible using nutrient reduction, ozonation and membrane technologies

Case Study
Caloundra/Maroochy water cycle management

- the current way of disposing of our waste is unsatisfactory
- the Maroochy River had a D grade (poor) in 2004 due, at least in part, to effluent discharges to the river
- the outfall at Kawana has long been a source of controversy and a waste of water
- current dam storages will meet the needs of Caloundra and Maroochy for approximately another 30 years
- increasing population is occurring at the same time as climate change resulting in decreased run-off to refill dams
- current production from Landershute is 21,000 ML per annum
- over 50% of this goes to a wastewater treatment plant (assume 50%)
- 85 - 90% can be reclaimed (assume 70%)
- expected yield from rainwater tanks with trickle top-up is 25 – 30% on Gold Coast (assume 20%)

Current storage ML/a	52,000	52,000	52,000	52,000	52,000	52,000
demand	21,000 current	42,000 X 2	63,000 X 3	84,000 X 4	105,000 X 5	126,000 X 6
50% at STP	10,500	21.000	31,500	42,000	52,500	63,000
70% recovery	7,000	14,700	21,700	29,400	36,400	44,100
Current + recycled	59,000	66,700	73,700	81,400	88,400	96,700
Rainwater 20%		8,400	12,600	16,800	21,200	25,200
Current + recycled + rainwater		77,100	86,300	98,200	109,600	121,900

Caloundra/Maroochy water supply with recycled water and rainwater tanks



Benefits of recycling at both ends of the pipeline

- recycled water and rainwater could supply four to five times the present population in Caloundra and Maroochy without any restrictions on demand
- it reduces waste and pollution caused by present disposal practices

Benefits of recycling water to the urban supply

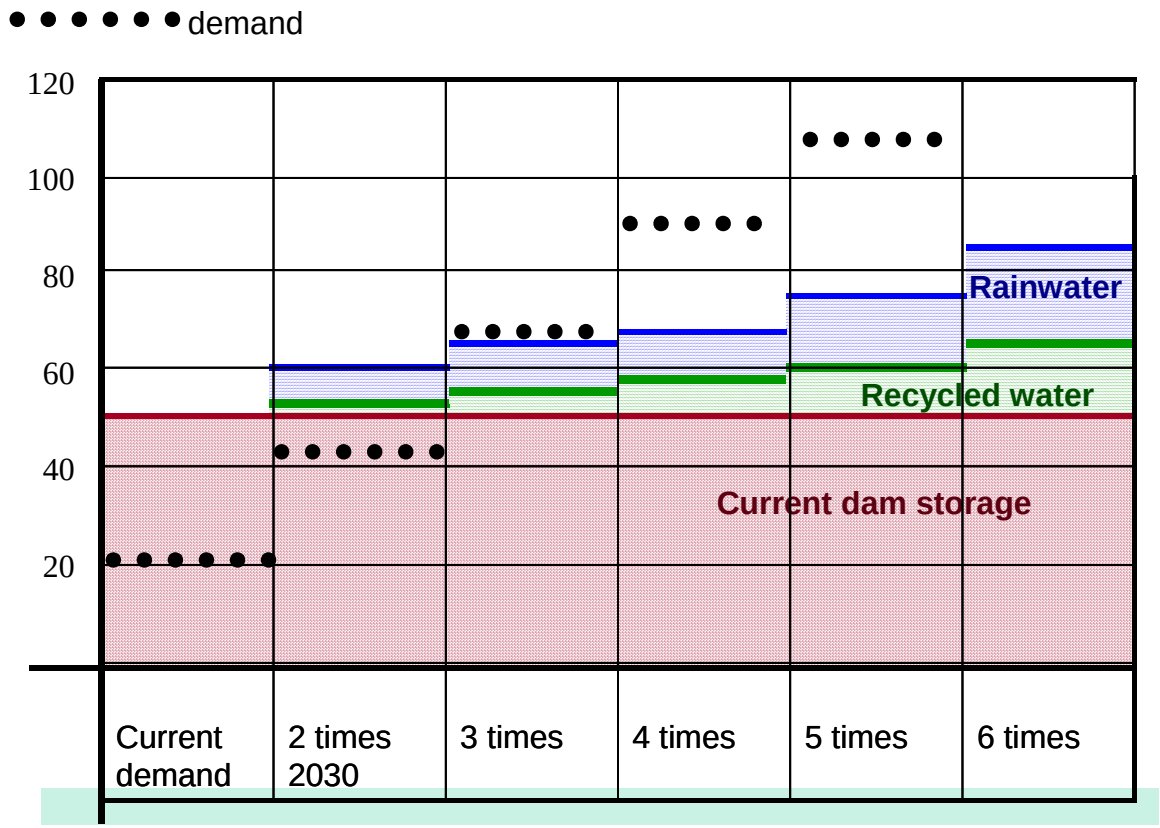
- an alternative *secure* supply that reduces our dependence on dams
- not affected by climate change
- demand and availability coincide – unlike the mismatch when recycled water is used to meet the seasonal needs of plants

Dual reticulation

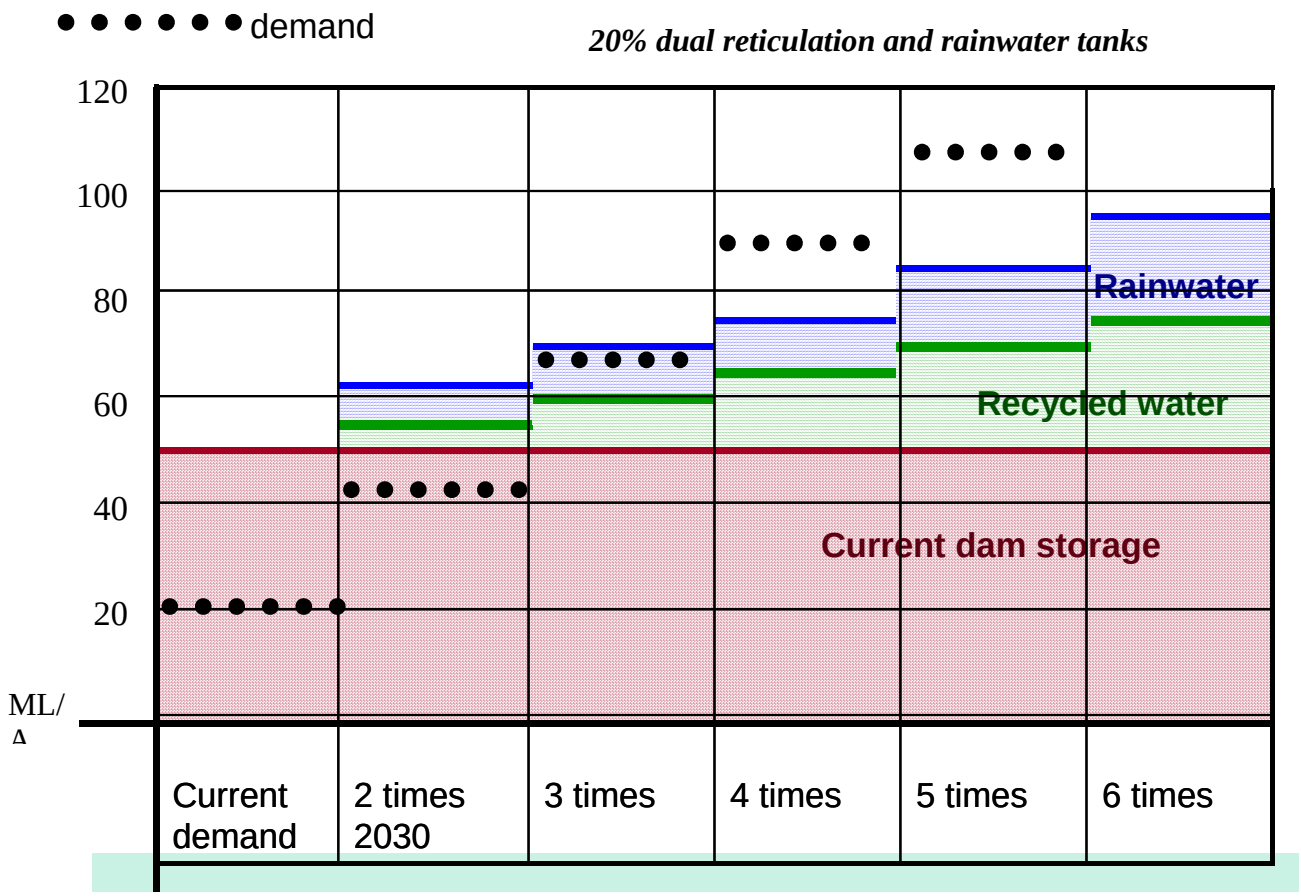
- unacceptably high capital cost to lay the second pipe in areas already developed
- higher infrastructure costs are met by developers
- nutrient management facilities required when excess effluent is discharged to a waterway
- Salinity is a potential problem
- precautions needed to avoid cross-connection
- re-use potential not maximised - 20% of demand supplied by recycled water is very optimistic
- cost of recycled water is higher than current reticulated water
- competes with greywater and stormwater recycling

Current storage	52,000	52,000	52,000	52,000	52,000	52,000
Demand	21,000 current	42,000 X 2	63,000 X 3	84,000 X 4	105,000 X 5	126,000 X 6
10% dual retic. usage		2,100	4,200	6,300	8,400	10,500
20% dual retic. usage		4,200	8,200	12,600	16,800	21,000
70% recovery	7,000	14,700	21,700	29,400	36,400	44,100

Above: Caloundra/Maroochy Water supply with dual reticulation



Above: 10% dual reticulation and rainwater tanks



Desalination v reclamation

- the amount of energy required to purify water depends on the concentration of pollutants in the water
- wastewater contains a lower concentration of pollutants than seawater
- the operating cost, energy use and greenhouse gas emission are three times more for desalination than for reclamation
- desalination does not prevent pollution and waste at the 'other end' of the pipeline
- further expense could be incurred if upgrades to wastewater management are needed

Effluent discharge reduction options for Melbourne (CSIRO)

OPTION	Cost $/kL	Volume used %
Demand management	0.10	1 - 12
Industrial recycling	0.16	<1
Land irrigation	0.20	8 - 10
Aquifer storage	0.31	10 - 20
Cardinia Reservoir	0.39	95
Woodlot irrigation	0.42	2
Constructed wetlands	0.59	2 - 2.5
Sewer mining with local re-use	0.66	0.2
Untreated greywater re-use	0.72	<1
Dual reticulation new lots	0.99	5
Dual reticulation refit	1.99	5
Treated greywater re-use	9.86	<1

If it is clean enough to put in the river, it is clean enough to put in the dam

Examples of water recycling

- Upper Occoquan, Virginia
- Hanningfield, Essex
- NEWater, Singapore
- Windhöek, Namibia

Upper Occoquan

- the Occoquan Reservoir is a large water supply source in Northern Virginia
- the Occoquan Watershed was largely rural until the 1960s, when the opening of a highway created a rural/suburban area convenient to people working in Washington, D.C.
- the resulting development led rapidly to water quality problems in the reservoir
- the main culprits were eleven secondary wastewater treatment plants that discharged into the reservoir
- water quality dramatically improved in 1978 when the plants were replaced by a water reclamation plant
- treatment processes include nutrient reduction, filtration, activated carbon and flocculation water has been successfully reclaimed for more than 20 years
- it supplies 50% of the water for the Fairfax Water Authority, which serves a population of 1 million people

Hanningfield

- Essex water supply area is one of the driest in England and currently imports over 50% of its water from outside its shire boundary.
- as no additional water is available, water is recycled
- effluent is taken to a purpose-built recycling plant for further tertiary treatment
- the reclamation plant treats effluent from Chelmsford STP, removing phosphates, nitrates, ammonia, oestrogen and pathogens
- the recycled water is discharged to augment the flow of the Chelmer River upstream of the Essex & Suffolk Water intakes to Hanningfield Reservoir
- water from Hanningfield Reservoir is given further treatment, including ozonation, before it is supplied to customers
- the scheme can provide up to 40Ml of water a day or 8% of additional water resources

NEWater in Singapore

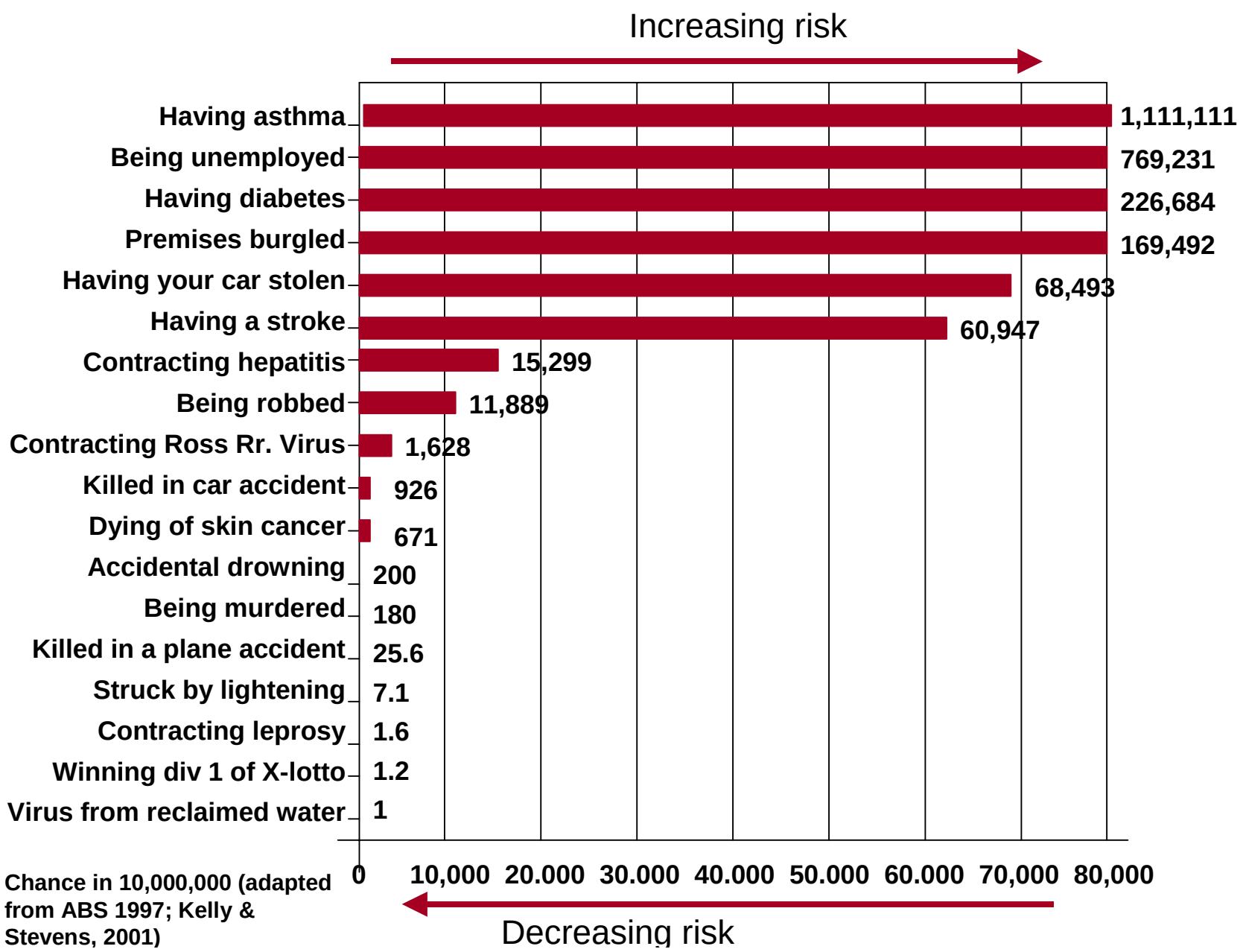
- Water recycling has been successfully introduced in Singapore to reduce their dependence on supplies from Malaysia
- NEWater is treated used-water that has undergone stringent purification processes using dual-membrane (microfiltration and reverse osmosis) and ultraviolet technologies
- it was monitored and assessed by a team of experts who unanimously agreed that NEWater is a safe and reliable product, “ready to drink”
- NEWater is used by carbon chip manufacturers who require very pure water and the rest is discharged to the reservoir
- water from the reservoir has conventional treatment before it is supplied to the public
- NEWater currently supplies 1% of total daily water consumption. This will gradually increase
- much of the technology and expertise for the NEWater plants comes from Australia
- the Visitors Centre is an important feature and responsible for the community’s wide-spread and enthusiastic acceptance of recycled water

Windhöek, Namibia

- Windhöek, the capital of Namibia, has a population of approx 250,000
- it lies between the Kalahari and Namib deserts
- it has an annual average rainfall of 360 mm and an annual evaporation of 3,400 mm
- The only perennial rivers are 750 and 900 km away on the northern and southern borders of the country
- local springs and dams on ephemeral rivers are insufficient for the town
- Windhöek has been successfully recycling water directly to its reticulated supply for more than 30 years
- water quality in the local dam has been seriously compromised by informal settlements (squatters) in the catchment

- it is sometimes not as good as the effluent from the wastewater treatment plant
- the effluent is therefore discharged to the dam
- a new reclamation plant, completed in 2002, treats the blended water
- the plant was designed on the basis of a multi-barrier system
- it includes ozonation, activated carbon filtration, dissolved air flotation and membrane ultra-filtration
- various safeguards are in place to manage any variation in raw water quality
- water quality monitoring is undertaken in a sophisticated water laboratory
- as well as the final product, the incoming wastewater, treated effluent, water in the dam and the blended water are all frequently tested

Comparitive risks



Chance in 10,000,000 (adapted from ABS 1997; Kelly & Stevens, 2001)

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Maroochy Shire Council

Powerlink Queensland

Cooloola Shire Council

Noosa Council

Shire of Kilkivan

Maryborough City Council

Woocoo Shire Council

Tiaro Shire Council
The Mary River Shire

Queensland Government
Department of Primary Industries and Fisheries

Proudly Supported by Caloundra City

Gympie District Beef Liaison Group Inc.

Tiaro Landcare

Barung Landcare
Working for our future

Gympie & District Landcare

Lake Macdonald Catchment Care Group

Landcare Noosa & District

TOSHIBA