

## AUSTRALIA'S WATER CRISIS.

*Something is happening.....*

**Most people are very surprised to learn that part of mainland Australian – from around Newcastle in NSW to Euroa in Victoria is now included on the United Nations' list of the Top Ten Global Water Hotspots. What is happening?**

The broad Australian community now has a high recognition of the link between carbon dioxide emissions and global warming. Awareness about the link between global warming and predicted climate change is not as well established, while knowledge and appreciation of our historical climate record is sparse.

At the present time, many people believe that our weather (climate) is changing and a number of people are attributing this to global warming.

### ***It's Dry***

CSIRO analysis of rainfall data from all weather stations across Australia with at least 60 years of continuous measurements (approximately 7000 weather stations) indicates that since around 1880, Australia has experienced three rainfall shifts (wet periods). These were 1885-95, 1944-58 and 1969-78. For the rest of the time the mainland has been relatively dry. The longest dry period lasted 44 years (1900-1944)! At the start of that period we had a population of 3.78 million people and at the end of it, 7.48 million.

Since the start of the new century our weather has been very dry for most the time, throughout most of eastern Australia, where most of us live. Many places have already experienced four years of "drought" and on the mainland many areas have experienced seven years and some areas have experienced ten years.

We appear to be entering another period that may be characterised by a sequence of "dry" years and this time we are starting with a population of about 21 million people. How long this dry period might last, we don't know.

On top of this, it is predicted that we will experience reduced rainfall on the eastern side of the mainland that is linked to global warming. These two climate-change scenarios, running in parallel, coupled with the current policy settings around population and an ever-increasing demand for water by various economic sectors, means and that we have a crisis on our hands that needs to be responded to now.

### ***What is it about our rainfall?***

Rainfall is a key component in any weather system. Australia is a very dry land and rainfall is highly variable between years and between locations. **In fact, Australia has the greatest rainfall variability of any country on Planet Earth. We are captive to this variability and we will continue to remain so.**

Early European settlers were struck by the rainfall variation. Australian rivers and streams could be raging torrents bursting their banks in the spring and then slowing to a trickle by mid-summer. The iconic river Murray is a good illustration of this natural variability in flow. The long term, average run-off reaching the Murray River is 11,259GL (**One GL is one billion litres**), but this can vary from 1,670 GL in a very dry year to 30,000 GL in one very wet year. The Ord River in Western Australia has a long term average flow of 3,980 GL. This can be as low as 1,000 GL and as high as 12,000GL. Most of the rain that does fall across Australia is returned to the atmosphere through evaporation only about 12% flows as surface water into streams rivers lakes and wetlands. Some of it enters into aquifers under the land surface.

**Computer modeling of the impacts of global warming upon climate in our part of the world predicts that climate, and therefore rainfall, is going to become even more variable.**

### ***We have experienced many droughts.***

During the one hundred years, between 1895 and 1995, we have experienced nine periods of serious drought. These periods have lasted from 2-8 years. In each case, drought was experienced in at least two states and on one occasion (1918-20), all states were experiencing drought conditions. Overall, serious drought has been experienced somewhere in Australia, in 39 out of these 100 years. In the twelve years since 1995, much of the central and southern mainland has experienced 7 years of severe drought and some places have experienced 10 years so far.

**People should be asking whether the situation that is now being experienced in many parts of Australia is just a long and severe “drought” or the beginning of a fundamental change in our weather patterns that will have major impacts upon freshwater availability. How will we have managed as a nation should we experience say 49 years or 59 years of severe drought by 2095?**

### ***What water do we use and how much are we using?***

Throughout most of the last century governments invested heavily in the construction of large water storages through out Australia so that by 2000, we

had constructed nearly 500 large dams with a total storage capacity of almost 84,000 GL. Most of this capacity was built after World War-2, that is, during decades that were a lot wetter on average than in the first half of the same century. **In 2004, across Australia, just over 44,000 GL of water was stored in large dams and by 2005 it was just below 40,000 GL.**

**If we are now entering a period when there will be less rainfall, more frequent dry periods and less rain falling in those catchments that contain the major storages, how “reliable” is this storage network for surface water going to be given the current rates of water consumption and use in our cities?**

In addition to this surface water, storage capacity, Australia has an extensive network of underground aquifers which contain groundwater. Each year these underground systems are recharged through part of the annual rainfall draining into the various systems. In 2004/05 the systems were recharged by an estimated 49,000GL. It should be remembered that many of these aquifers are very deep and therefore not easily accessible. In addition the impacts that tapping this source of water could have upon the environment and the surface water systems, are not understood.

We are using more water than ever before. In an average year, without drought, we now require, for consumption and use, approximately 24,000 GL of freshwater. Between 1984/85 and 1996/97 our water requirement rose by 65 per cent. Water extracted for irrigation rose by 76 per cent while urban and industrial requirements rose by 55 per cent.

In 1996/97 our water requirement was made up of about 19,000 GL of surface and in addition we pumped nearly 5000GL from aquifers.

The water that we consume and use for human activities (on farms, in our cities, in manufacturing, mining and service industries) is either **surface water** or **ground water**. Some **water is directly consumed** in personal activities such as washing and cleaning, food preparation, removal and treatment of human waste etc. and a lot of **water is used** in the growing and processing of food, the manufacture of goods and products and the use of services (gyms, swimming pools, sporting facilities etc. Much of the **used water is “embodied ”**in the food and good that we require and which we also export in the conduct of international trade.

### ***Who is using this water?***

While the ABS reports on freshwater for a range water use sectors, there are three major ones. These are agriculture, households and industries - manufacturing, mining and service industries. Depending upon location the water can be exclusively surface water or a mix of surface water and groundwater. Water quality will also vary from potable water (the highest quality for human consumption) to industrial quality, bulk water as used in farming and mining.

### ***What has been happening across large areas of our farming land?***

The recent decades of low rainfall years have come at the same time as major changes in rural land use, widespread changes in catchment hydrology and a steady expansion of urbanised areas. More and more surface water is being removed and in a number of places on the mainland, groundwater is being pumped at levels which are not sustainable.

In addition to the major water storages, there are millions of small farm dams across Australia. Many of these are on “hobby farms”. They hold an estimated 9 per cent of all stored surface water. Small farm dams have two major impacts upon the hydrology of a catchment. They trap an appreciable amount of water that does not therefore enter the major waterways and, because of their relative shallowness, evaporation rates are usually high. In the past, farmers were encouraged to build these small farm dams as a form of drought proofing. However, because so many small farm dams actually reduce the amount of surface water reaching rivers and streams, many municipalities now require land owners to apply for a planning permit to establish a small dam.

During recent years we have seen a significant expansion in irrigation farming to include irrigated broad-acre crops like sugar cane, rice and especially cotton. As an example, in a space of twenty years, irrigated cotton alone increased from 50,000 ha in 1980 to 375,000 ha in 1999 and now Australia is the world’s third largest exporter of raw cotton.

In regard to irrigated horticulture, there has been a significant, recent shift and expansion into ‘high value’ products. For example, the value of the almond crop in Australia in 2000/01 rose from \$7 million to \$29 million in 2004/05, a four-fold increase in value. The value of the orange crop in the same period fell by 20 per cent. These high value products tend to be water hungry and productivity can be lifted significantly if more water is used strategically within a growing cycle. **One enterprise in Victoria has 500,000 almonds trees in production. Water is applied through the spring and summer at rates of 15-17 ML (one ML is one million litres) per hectare. From the figures available it appears that this form production is requiring 6 litres of water to grow one almond.**

As well there has been a move into **farm forestry** stimulated by the emergence of Management Investment Schemes. At the present time there are 1.7 million hectares of tree plantations. Under the National Plantation Initiative, the target is to have 3.0 million hectares under cultivation. Most of the current plantings of new trees are eucalypt plantations to supply trees for woodchips. Location of the land and annual rainfall are important considerations here and so many of these plantations are in “wet”, temperate areas and close to the coast.

Large areas of plantations, stimulated by Management Investment Schemes, can have a significant impact upon water delivery within the catchment because under the present production systems the trees can remove 1-2 ML per hectare

each year. Because the trees are harvested at 11-16 years and another crop is planted one year after harvest, this water demand never stops.

### ***What has been happening in our cities?***

**Our most populace capital cities are now almost totally disconnected from what has been and is going on.** As the current dry period has progressed, the mind-set has been that we are probably experiencing “just another drought”. In general, this has been the situation described in print and electronic the media, by commentators and by many political and business leaders.

State governments have restricted their use of regulatory powers, often fashioning a response to the steadily declining water supply situation from risk management and political considerations. Restrictions on domestic water consumption have focused primarily upon water consumption outside of the house, restriction have been introduced incrementally and often far too late. In NSW and Victoria major announcements about water restrictions were made **after recent state elections.**

At the end of December 2006, water restrictions applied in 28 out of 32 cities across Australia with a population of greater than 50,000 people. A total of 15,602,000 people are on Stage 3 or Stage 4 restrictions. This is 71% of the Australian population. While governments restrictions upon water use outside of the home is an appropriate step, as a policy instrument, its effectiveness is very limited because it fails to bring about in any behaviour change in regard to water being consumed inside residence. Indeed the behaviour change with water restrictions is not locked in and parliamentarians and water industry leaders have stated publicly that people should not have to live with water restrictions.

There is now international interest in the determination of the water impact of each nation upon the global supply of water. This is being done by measuring various "water footprints" - domestic, industry agricultural etc. Each of these is the **daily water consumed plus the daily water used** in the conduct of particular actions and activities (farming, international trade, maintaining households etc). The "**Domestic Water Footprint**" therefore is the water used in households for washing, cleaning, gardens etc PLUS the water that has been used (and is therefore embodied) in the food being eaten, goods and services purchased and required etc.

**International comparisons now show that Australia's Domestic Water Footprint per capita is the highest on Planet Earth. In an average year, an average household of four people consumes about 330,000 litres of freshwater and uses another 2,700,000 litres. Half of this used water is what it takes to produce the foods that we eat.**

### ***What has been happening with our manufacturing, mining and service industries?***

Business and industry is our third largest water-use sector. The main users here are manufacturing, mining and minerals processing and the service industries. In 2004 the manufacturing industries required 541GL and in recent years water demand has been increasing by a few percent each year. With the mining boom that we are experiencing, mining and minerals processing is requiring more and more water. In the past four years water use has increased from 452 to 608 GL – an increase of 35 per cent. Projecting current rates of expansion for these industries, the water requirement will increase nearly threefold. Service industries are becoming major users of freshwater and because these industries tend to be concentrated in and around highly urbanized areas, this is adding to the pressures on urban water supply. In 2004, these industries required 1041 GL.

### ***What has been happening with the natural environment?***

It is now very clear that this increasing use of water to support human activity is having a devastating impact upon the natural environment and the aquatic environments in particular. In some places these biological systems are in free fall because too much fresh water is being taken out of them to support human activity. There is a real risk that progressively; these systems will no longer be able to support themselves.

The extent of our degraded aquatic environments is evidenced by the following:

- Surface water is over allocated for most rivers in the NSW section of the Murray Darling Basin, the rivers in western Victoria and on the eastern side of St Vincent Gulf in South Australia.
- In Victoria, most rivers north of the Great Divide and running to the River Murray are fully allocated. Water being removed from the Queensland portion of the Murray Darling Basin is at 70 per cent of the sustainable yield. This is the same for rivers north of the Basin, from Charleville to Townsville. The situation is the same for rivers north east of Adelaide. With such high allocations and extended periods of very dry conditions, natural flows can become so low that the rivers and streams cannot sustain aquatic environments.
- River health, measured by the presence of aquatic invertebrates (such as worms, yabbies, beetles and hundreds of others) is poor. A national assessment reveals a substantial reduction of these invertebrates along 22,000 kms of river length. In NSW the loss is evident along 50 per cent of river length. In the ACT and Western Australia, it is evident along 35 per cent of river length while for remaining States and Territories, the loss is between

12 and 24 per cent.

- Riparian vegetation (the grasses, bushes and trees growing beside rivers and streams) is substantially modified along 85 per cent of these same rivers.
- Australia's wetlands have been seriously impacted by the spread of urban development and expansion of agriculture. Vast areas of wetlands, seen as swamps that could be completely drained, have been eliminated to make more land area available for cultivation and later housing development. More recently, while a better understanding of wetlands being important ecological systems has come about, wetlands degradation continues.
- With the exception of the top end of the Northern Territory and the north of Western Australia, most of Australia's large wetland systems are in a seriously degraded condition. Ninety percent of the wetlands in the Murray-Darling Basin and 95 per cent of the Gwydir wetlands are gone. The Narra Lakes are only receiving 32 per cent of their natural flow and the Macquarie marshes and the Condamine-Balonne systems are collapsing. Bird counts on these large wetlands have dropped by as much as 80 per cent. Over extraction of water for irrigation is a major cause of the current situation and if these systems are to survive, they must receive large volumes of environmental water urgently.
- Across Australia, approximately 85 per cent of river length is in catchments that have been changed from their natural condition, mainly by recent land clearing, changes in land use, and broad acre agriculture.
- Each year, some 19,000 tonnes of phosphorus (from fertilizers) is transported by our rivers to be discharged into our estuaries and coastline. Over 80 per cent of the river length has suspended sediment loads (i.e., the particles that make water cloudy) that are 10 to 200 times greater than normal.
- Approximately 28 per cent of the estuaries around Australia's coastline have been significantly modified by pollutants, dam building, dredging, wetland drainage and other effects of human settlement.

***Forest fires are very thirsty and for a long time.***

All vegetation needs water to grow. Trees are no exception. Trees draw water out of the ground and a lot of it passes up through the roots, the trunk and then evaporates from the leaves. Eucalypts tree have a high oil content and this makes them very fire-prone. After fire, a re-growing forest uses vast amounts of water, especially for the first twenty-five years.

Over millennia, indigenous Australians used fire as a tool to manage grasslands, forests and fauna. European settlers, fearful of fire, had to learn to live with naturally occurring bushfires. The modern-day response to a bushfire is a sophisticated one, with the goals of protecting life, property and water supply

catchments. Depending upon the circumstances, the fire may be suppressed or just contained

We are also familiar with the response of the bush after a big fire. New green shoots emerge from the soil and as soon as it rains, the vegetation bursts into life again. Three to four years later, a lot of the bush is looking very green again the insects have returned, the birds have followed them and native animals are moving around at night.

What we can't see is the longer-term impact that the fire is going to have upon the hydrology of the catchment. When rain falls on a forested area soon after a bushfire, surface water run-off can actually increase for a very short time. There may even be a serious flood because the trees have no canopy so there are no leaves getting in the way and very little transpiration. **As the new growth begins, leaf density in the canopy explodes, transpiration rises and the surface water runoff drops off.**

This effect often peaks about thirty years after the fire although it can sometimes last for up to seventy years. The long-term effect upon water supply can be huge, especially when a very large area that can be destroyed. For example, the 1939 fires in Victoria resulted in the destruction of nearly two million ha of forests. Mature native forests in some of Melbourne's water supply catchments were also destroyed by the 1939 fires. This shortfall was a staggering 6,000,000 litres per year for every hectare of forest. This deficit was experienced every year for the next thirty years.

Predictions of the impacts of global warming upon southern Australia include a rise in average daily temperatures, more hotter days and drier catchments. If these predictions lead to a situation where we have more frequent fires and larger areas within the catchments that are burned, then water runoff in these same catchments is going to decline even further. Remember that rainfall over many of these catchments is also predicted to decline. Water shortfall from fire effects and subsequent re-vegetation will become an even greater constraint on overall water availability.

### ***As a nation what are we doing?***

**There are now clear indicators of an unfolding water shortage throughout much of eastern Australia, and in particular in those places where there are the greatest densities of population. Despite some of these indicators being available to governments for at least twenty years, we have no national plan in place to drive the sort of change and the scale of the change that will be required across Australia.**

As a nation, how are we positioning ourselves should we be facing several decades of very dry weather? The sharp end of all this will be a decline in water availability in the very places where most of us choose to live and where the widest variety of our food is

being grown. Remember that this time we are starting with a population of nearly 21 million.

We rely upon the agricultural sector to produce the food that we all require and this sector always experiences the full impact of these extended dry periods. What must we do to ensure that genuine farmers and rural communities can continue to produce our food and fibre from the land that they are farming now - and get a fair price for it? There are real opportunities for our farmers to become more water efficient but at the present time they don't have the money to pay for these advances. Programs such as the National Water Initiative and the Living Murray Initiative aim to address some issues, but there is a significant discrepancy between what is being done and what needs to be done. Our industries too must become more water efficient. There are some signs that the changes may be commencing but the rate of change is too slow. And what do we have to do to get urban dwellers to really play their part?

**A key action has to be the initiation of nation-wide programs and activities so that Australians first become efficient and then super-efficient in their use of water – in cities and homes, factories and farms, in leisure activities and in public facilities.**

State governments and their water agencies have been very slow to grasp opportunities for large-scale water recycling and stormwater capture and use. In 2004 only 1.2 per cent of the water being used in mining, was then being treated and re-used. In manufacturing the figure was 2.2 per cent. The situation for cities on the mainland is little different. Our three most populous capital cities have large metropolitan areas (Brisbane-98.9 sq. km, Melbourne-36.5sq. km and Sydney is 27.8 sq. km). The three cities on have vast impervious surfaces and in an average rainfall year large volumes of stormwater (1,285 GL) running off into nearby waterways and /or into the sewerage systems. The cities lack infrastructure (and appear to have no plans for such infrastructure), so as to capture and treat then reticulate a significant amount of this stormwater.

**The tokenistic, national approach to large-scale stormwater capture and use is a disgrace although it is understandable. In 2004, there were sixty five separate pieces of legislation on the statutes of various state governments across Australia, all impacting in some way upon water re-cycling.**

At the present time there is widespread promotion that households can reduce their water requirements by installing rainwater tanks. Governments offer financial incentives and advisory services. A behavior shift is beginning in this respect although it remains still slow. In 2004 only 17 per cent of Australian households had a rainwater tank

### ***The Big Issues and Opportunities***

#### **Clarification of the status of water**

There is a need to determine whether our water is a common good or instead, a commodity that can be privately-owned, traded and bequeathed. Even though we are several years down the track in forming a national water market, it appears that this matter of the status of water has not yet been fully tested on legal and constitutional grounds.

Under our democratic system there are two ways that this can be done. Either a reference could be given to a full bench of the High Court of Australia, or the matter could be the subject of a referendum. Clarification of this fundamental question is critical to the long-term security of our irrigation industries and the future supply of water to our cities. It is particularly important that this matter be determined soon, given the COAG decision to have a national water market operating by 2014.

### **Establishing national water accounts**

In order to better manage our water resources, it is now recognized that a set of accurate and reliable National Water Accounts must be developed. These would track and describe how much water is used, where it is used and for what purposes. Clearly, it is important that such accounts are comprehensive and fully transparent.

The National Water Accounts currently proposed by the National Water Commission need to be expanded to record estimated volumes of water being stored. This could mean the inclusion of aerial survey data and volumetric estimates for small farm dams. States will then be able to determine what planning controls need to be put into place.

From July 2007 in Victoria, Water Registers begin to come into operation. Ultimately, these registers are to be set up across Australia. As presently conceived, the registers will record the party that owns a water right and the volume of water. There will need to be sufficient detail, and full transparency, in the proposed National Water Accounts in order to track all water trades and in particular, the purposes to which the water in each trade is being put. Without such integrated detail, there can be no guarantee that water trades will deliver water to places and purposes which maximise agricultural benefits to the broader community.

### **Debate and set a final population target for 2050**

Population and the rate of population growth have become important determinants of direct water consumption as well as accounting for the use of large volumes of embodied water, particularly in our cities. This in turn raises the question of what population of humans the continent is going to be able to support, assuming that there is agreement that as a responsible society we must live, grow, trade and function with the constraints of environmental sustainability.

It is now an appropriate time for a proper inquiry with recommendations that will guide the setting of national policies regarding Australia's final population target and the rate of population growth that is required to reach this target.

At the time that recommendations from such an inquiry became available, the Commonwealth Government would give a reference to the Productivity Commission for a broad inquiry into the likely impacts upon various sectors of the economy should Australia begin moving towards a definite population target to be reached by 2050. The Commission's finding also would be integral to governments making the required changes to current policy settings.

If such public processes are not initiated in Australia soon, we will experience serious difficulties in becoming super efficient water users. The States, faced with ever increasing numbers of people demanding services, will remain in a situation of always trying to catch up. In addition, our cities will fast reach their limits – not because suitable urban land cannot be made available, but because of climate-imposed restrictions on the supply of freshwater.

### **Mandating water audits for industry and government**

Even though the majority of available water is used by agriculture, significant quantities of water are used by industry and government. Under present arrangements, there is no formal and legislated requirement for auditing and reporting on this water use.

COAG should draft and adopt uniform legislation and regulations that require the regular conduct of water audits by industry and all agencies in the three levels of government.

### **Support and resourcing of water literacy to bring about behaviour change**

Current programs in most States that focus on water conservation and behaviour change must extend well beyond TV campaigns, newspapers and websites. Raising people's levels of water literacy must become ongoing campaign. The next generations should have only the experience of being super efficient water users. A national funding program is required to develop and support wide-ranging community initiatives (in schools, community organisations, on the shop floor) directed at achieving the sophisticated levels of water literacy. These will help to make the necessary changes in all sectors of Australian society – agriculture, business and industry, large and small organisations, government, and households.

A key part of the education for changed behaviour lies in the link between agricultural efficiency and the amount of water that is embodied in the food and fibre consumed and used by large urban populations.

Information for consumers on Water Bills can play a key role in conveying crucial messages about water efficiency. This information, however, must reflect a more robust notion of efficiency than what tends to be employed at the moment. The

communication strategies should be aimed at helping people to keep driving down the volume of water used in their homes. Ideally, real water efficiency is achieved when the same activities are undertaken with low volumes of water which is also used over and over.

A standardised, formatted Water Bill needs to be introduced across Australia and used as another means of educating water consumers. We are a highly mobile population, and this would create a situation where consistent information was presented in the Bill no matter where a person lived or had come from.

Given the changes that are required as quickly as possible, there is a special case to be made about the re-education of licensed plumbers as well as increasing the numbers of plumbers over the next several years. Initiatives such as Green Plumbers point the way here. The advances in water saving technologies will be rapid and widespread. Plumbers are central to consumers being able to adopt these technologies with relative ease.

### **New programs to make our cities and suburbs water efficient**

With the exception of Darwin, each of the mainland capital cities is facing a progressive and major reduction in surface water availability over at least the next thirty years. The expectation that an additional 5 million people will locate in our capital cities by 2030. There is a tendency to focus on increasing the supply of water rather than on driving down consumption and bringing about the behaviour change characteristic of super efficiency.

Within the next twelve months, all State and Territory Governments around Australia should take up the following challenge:

Bring together the leaders of the government and opposition parties to a Leadership Roundtable to agree on a program that has the core objective of making every urban household in Australia water efficient and then super efficient through the retro-fitting of existing water-saving, domestic devices and technologies.

After detailing the possibilities, the Leadership Roundtable would enter into a formal bipartisan Agreement which is broadcast to the broader community and provides the details of proposed actions and the means for reaching them.

A central requirement of this deliberation would be a revision of targets (that can be nationally co-ordinated) for future household water consumption in our cities based on expectations of decreased household consumption. This would lead to a truly national program being carried out over the next ten or so years. To achieve this end, legislation and regulation, inspection, auditing and reporting would be employed.

Therefore:

- Water retailers would be required to establish a separate business responsible for implementing a retro-fitting program with customers;
- Water retailers would be required to offer a range of purchasing and payment plans for customers. These could range from once-off payment to payment of the retro-fit from the retailer's sale of saved water;
- All multi-storey dwellings would be required to fit dual flush toilets, certified, water-efficient, shower heads and a "dead space" water saver. Dwellings of one or two stories would be required to be fitted with the same, as well as a 2000-5000 L outside tank that would collect roof water.
- There would be consultation with various parts of the building and construction, manufacturing and post-secondary education sectors, in order to introduce mandatory requirements in respect of water efficient devices;
- Regulations would be introduced at an appropriate time, which required properties being presented for sale, to be retrofitted. As well, schemes would be resourced and promoted to encourage public display and recognition when households became water efficient through retrofitting.

### **Improving irrigation efficiency in the Murray-Darling Basin**

Maintaining agricultural production in the Murray Darling Basin is a critical issue for Australia. However, farming must become a sustainable operation. Four actions are required:

1. Bring about major improvements in irrigation practices throughout the basin so that at least 50 % of the irrigators move to current best practice. Achieving this will require significant inputs governments, farmer organisations and private consultants into farmer education, on line education services, advisory services, mentoring, field days, farm tours, demonstration activities and research
2. Provide training in the use of state -of- the -art irrigation technology. Irrigators will need incentives to adopt this into their farming with the incorporation of such things as modern water metering devices, moisture probes, salinity probes and online access to weather information and satellite imagery.
3. Initiate a basin-wide program to re-furbish the irrigation infrastructure to reduce water losses.
4. Accelerate the policy development work that needs to be done in order to consolidate gains in water saving. This will mean that the proposed National Inquiry into Water Pricing would be given a high priority as well as work to be done around water trading rules and regulations

## **Reduce Adelaide's dependence on the Murray River using desalination**

A strategic national approach needs to be taken with these large scale water infrastructure projects. In the case of desalination technology, the Commonwealth government should provide some leadership here by directing significant capital funds over the next twenty years to South Australia to invest in desalination technology. The long term objective would be to provide Adelaide a with a significant desalination capacity, so as to remove its dependence on the River Murray and provide its residents with potable, low salt, water.

While Adelaide's population will have low, comparative growth to 2050, it is expected to grow by about 8% (14). Into the future, Adelaide must deal with an expected reduction in surface water runoff into the Murray-Darling, because of climate change, together with the likelihood that more lasting solutions to the management of salt in the river systems of the MDB is going to take many decades.

## **Establish a national program to re-establish riparian vegetation throughout rural Australia by 2050.**

Across rural Australia, there are thousand of kilometers of stream and riverside frontages that are presently used as farmland. Some of this land is privately owned although much of it is not. It is in fact Crown Land that is allowed to be used by the agricultural enterprise under a lease between the land user and the particular State government.

In most situations the lessee is required to erect and maintain fencing along the length of the frontage, although this has not always been the case. In many situations the prescribed width of existing riparian strips is between 20-150 metres.

Often the inspection of fences has been patchy, fences have fallen into disrepair, and at times stock have been able to graze right to the water's edge. As a consequence, there are now serious degradation issues concerning our freshwater aquatic ecosystems and reduced water quality in many streams, rivers and lakes.

**There is an important, landmark opportunity to make a significant impact throughout much of rural Australia by setting up a national program that re-establishes riparian vegetation along every river and stream throughout rural Australia. The goal should be to establish riparian strips 100m wide by 2050.**

This national program would require agreement by the states so that creating this width of strip would be introduced progressively as a condition of Crown Land leases. Costs for re-fencing, vermin and noxious control and removal of exotic trees would be met whole or part from the National Water Initiative.

As the re-vegetation progresses, a significant increase in tree cover will result and this will provide major opportunities in regard to proposed carbon dioxide emissions trading.

The long term gains to result from such a program would include:

- significant improvements in water quality,
- reduced chemical loads and salt leaching into rivers and streams,
- reduced salinity risk close to many rivers and streams,
- significant increases in vegetation cover across rural Australia,
- creation of major wildlife corridors , providing residential habitat as well as protected pathways for native animals to move and re-distribute as local climate zones a re-set,
- major improvements in the distribution and abundance of a wide range of terrestrial and aquatic fauna and native fauna,
- establishment of a major carbon sink to trap atmospheric carbon dioxide, and
- increasing farm property values.

### **Introduce a 50 year Water Investment Bond**

A national program to increase water efficiency and then move to super efficiency is going require significant expenditure. It may be that expenditure in the next 20-25 years will have to be at least \$50 billion. It will therefore require substantial government and private investment.

It is considered that a number of specific initiatives could be funded in whole or in part, through forms of ethical investment and a vehicle for this investment would be a long-term water bond. Bond holders would be offered a defined return on their investment; Trustees would place the investments in the financial market place and the differential return would be directed towards prescribed ethical investments.

The Commonwealth Government should encourage the establishment of a 50-year Water Investment Bond. Trustees for bond holders would manage investment projects, such as the re-vegetation of riparian zones, purchase, restoration and re-vegetation of degraded agricultural land. As part of the process to establish this Bond, the Commonwealth Government should encourage the finance industry to host a conference to be attended by government representatives, industry members and interested community organisations to further examine the feasibility.

### **Increasing support for rural communities.**

While all parts of the agricultural sector have been affected by the present drought, the irrigation industries have been particularly hard hit. Irrigators have experienced serious drought in the past but this time things are different. New forms of land management and new corporate operations set up under Managed Investment Schemes are having major impacts upon other irrigation enterprises. The general effect is to increase the operating cost of the irrigation enterprise. In areas where farmland has been converted to large scale eucalypt plantations, the new operation results in a substantial amount of money leaving the local economy.

The predicted drop in available water as a result of climate change means that future periods of prolonged and severe water shortage can be expected, and possibly with increasing frequency.

Governments need to move beyond the provision of drought relief and initiate a full re-structuring of parts of the irrigation industry. People's lives and livelihoods are at stake here, as well as regional environments and freshwater ecosystems. We can surely do better by people and the environment than watching land being abandoned, water rights being sold out of desperation, farming land being left as ghost properties, and rural communities left unsupported in a slow decline.

A national inquiry is needed to consider the position of irrigators and towns, rural communities, manufacturing and supply industries that depend on irrigation. This would identify needs and develop strategies to assist people in making dignified transition from the land, address the issue of rural infrastructure and programs for repair and restoration of rural lands.

Wayne Chamley.