6E: SUSTAINABLE WATER MANAGEMENT

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The Murray-Darling Catchment

…we have to take the long-term view that should this area be permitted to deteriorate any further, every Australian will suffer because of the severe impact on our quality of life, in terms of the region specifically, and, equally as important, the impact that it will have on our balance of payments.

David Connolly, Chairman, River Murray Parliamentary Committee, 24 August 1983.

The landscape and native flora and fauna of the Murray–Darling Basin were well adapted to the naturally saline conditions, and the low and highly variable rainfall and river flows of the region. However, the industries and preferred crops of our Western urban-industrial society are generally thirsty, exclusive, inflexible and salt intolerant. Even Australia's greatest inland river was too unreliable in its natural state to enable its valley to support intensive European settlement. This paper discusses some of the impacts of the irrigation of food crops on the sustainability of the Murray-Darling river system and the challenges in deciding on the future quality and quantity of its water.

Irrigation

Every day, Australians enjoy products of irrigation – fruit (fresh, canned, juiced, dried), dairy produce, wine, vegetables, rice, and meat. Many of these products are also valuable export earners. It is estimated that irrigation accounts for 20-25% of the gross value of Australia's agricultural output (around $4.8 billion) from a minute 0.4% of the total area of land in agricultural holdings. The Murray-Darling Basin dominates irrigation in Australia with 71% of our irrigated crops and pastures. Crabb (1997).

Irrigated pastures, for dairy cattle and fat lambs, account for 58.6% of the total area of irrigated land in the Murray-Darling Basin. Cereal crops, such as rice, maize and wheat, occupy 16.9% of the irrigated land. Intensive horticultural 'blocks' producing fruit, grapes and vegetables - in the Goulburn Valley and Sunraysia (around Mildura) in Victoria, The Murrumbidgee Irrigation Areas in New South Wales, and the Riverland (around Renmark) in South Australia - occupy only 6.3% of the total area of irrigated land but are economically extremely valuable. The remaining irrigated land is largely accounted for by cotton production. Crabb (1997).

Water use

The irrigation of crops and pastures in the Murray-Darling Basin accounts for 52% of all water used in Australia. More than 95% of the water diverted from the rivers of the Murray-Darling system is used for irrigation. Over 14% of this is lost through evaporation and seepage from water delivery infrastructure (especially unlined open canals and channels) before it reaches the crops. Very little of the diverted water returns directly to the river after it irrigates the crops and in some areas this contributes to water tables which mobilise naturally occurring salts and brings them to the surface. Only 3.8% of diverted water is used for domestic, industrial and commercial requirements. Crabb (1997).

The medium annual flow to the sea from the Murray-Darling Basin is now only 21% of the natural medium flow. The Lower Murray experiences drought-like 'minimum flows' for 61% of the time, compared with 5% under natural conditions. Images of the Aral Sea environmental disaster on the border of Uzbekistan and Kazakhstan provide a powerful reminder of the consequences of the over extraction of water from a system.

Despite signs of stress, and the establishment of the Murray-Darling Basin Initiative to integrate resources management over the whole Murray-Darling Basin, water diversions have continued to increase over the past 20 years. It was only in July 1997, that the Murray-Darling Basin Ministerial Council set an upper limit on the amount of water that could be taken from the river system. This is commonly known as *the Cap*. It represents a starting point to seriously 'take stock' of the consequences of past water policies.

Other impacts of regulation

The construction of dams and the storage of water to regulate rivers has produced many changes to Murray-Darling waterways. Regulation has almost reversed the natural flow pattern in sections of many rivers in order to provide water that coincides with the requirements of introduced crops and urban demands. Regulation also creates conditions which favour the requirements of introduced species, such as carp. The natural pattern of late winter and spring flooding along the Murray has been reduced downstream of major dams as their storages fill. In particular, ecologically important small and mid-range floods have been greatly reduced in number as they are absorbed into storage.

Releases from storage for irrigation now result in unnaturally high and cold summer and autumn flows. Cold water pollution caused by the release of water from low level outlets in reservoirs is one of the least obvious adverse impacts of regulation on river habitat. While it is most severe immediately downstream of a dam – where a 'cold water desert' is created - its effects can be mapped for sometimes hundreds of kilometres. The cumulative impact of cold water releases from the numerous dams on the inland rivers of Australia is enormous.

Scientists at Murray-Darling Freshwater Research Centres at Albury and Mildura are working on the huge task of understanding the ecology of the Murray and its floodplain, and the impacts of regulation – a task which only began in the 1980s. They have found broadly that there is a fundamental need for increased flows specifically for the environment, and much greater variability is required in these flows to maintain biologically healthy and diverse rivers and floodplains. Variability rather than stability makes the Murray-Darling system healthy. Research has also identified the need to reconnect the river and floodplain, and generally to adopt a more systemic management approach for a healthy system.

Originally, every drop of water in the rivers of the Murray-Darling system was used by the environment; therefore any diversion will have an impact. Two of the Murray's most experienced scientists, John Whittington and Terry Hillman (2001), have identified the challenges for scientists and community members in deciding on the future quality and quantity of Murray-Darling water:

> *The challenge for scientists is to identify, measure and understand that impact. The challenge for the community is to decide how much of an impact is acceptable.*

Community members have a huge responsibility to make wise and informed decisions about the future of Murray-Darling water. Water resource management bureaucracies are uncomfortable with this reality (Eastburn 1999). However, they are faced with the dilemma of having responsibility for a task on a scale that cannot be achieved through an 'industrial' model and technical knowledge base alone.

A revolution in water management

In 1982, an amendment to the River Murray Waters Agreement to include management for water quality, environmental and recreational purposes, in addition to quantity, resulted in a revolution in natural resources management – a change from a mechanistic to an ecological management perspective – and a flurry of administrative developments. These developments led rapidly to the establishment of the Murray-Darling Basin Ministerial Council (1985), and the Murray-Darling Basin Agreement (1987). The Murray-Darling Basin Commission has superseded the River Murray Commission (1988) and the Natural Resources Management Strategy (1989), creating the Murray-Darling Basin Initiative to co-operatively manage the resources of the Murray-Darling Basin as one unit.

The amendment was triggered by the emergence of salinity as a serious issue impacting on River Murray water quality - and therefore the viability of dependent irrigated agriculture, industries, towns and cities - and the landscape following a major drought in 1967–68. River water quality depends largely on land use activities in the surrounding catchments. Improved water quality for the River Murray therefore required the adoption of sustainable land use practices throughout the million square kilometre Murray-Darling Basin which necessitated intergovernmental and community cooperation. Community participation represented a major change in thinking for resources management and construction organisations in Australia (Bowen, 1994).

However, the 1990s saw a 'recourse to technocracy' and little investment has been made in building or realising the capacities of community members, either to deal with the crisis of resources degradation in the Basin, or to become authentic and effective partners in the Murray-Darling Basin Initiative:

> *The problems of the environment are indeed complex ones. They involve numerous parameters and interrelations. Lacking the necessary knowledge and approaches, individuals admit defeat and hand the problems over to the specialists. It is in terms such as these that recourse to technocracy is frequently justified. The result is the abandonment of any attempt to involve ordinary people, who come to be regarded as mere operatives or consumers.*
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> UNESCO 1980 cited in Robottom 1992

Conceptual, institutional and emotional impediments to sustainability

In 1998, a search of Australian advertisements for environmental management positions by two world experts on sustainable agriculture, James Woodhill (Australia) and Neils Roling (Netherlands), revealed an almost exclusive demand for environmental professionals from the biophysical sciences, giving '*the impression that "the problem" is to do with the "environment" and not with humans'.* They concluded that environmental management 'has been perceived primarily as a technical task' and considered it remarkable that the response of society centred on 'ecological consequences rather than on the social causes'.

We have been aware for more than 30 years that technical processes alone are inadequate for the achievement of sustainable resource use and sustainable communities. In April 1970, at the Australian Academy of Science conference on *Education and the Environmental Crisis*, biohistorian Stephen Boyden argued that:

> *The suggestion that all our problems will be solved through further scientific research is not only foolish, but in fact dangerous…the environmental changes of our time have arisen out of the tremendous intensification of the interaction between cultural and natural processes. They can neither be considered as problems to be left to the natural scientists, nor as problems to be left to those concerned professionally with the phenomena of culture…all sections of the community have a role to play …*

Woodhill and Roling argue that the '*balance and interconnection between the biophysical and social dimensions'* necessary to achieve sustainability, '*challenges traditional and often unquestioned beliefs about science, the "natural world", knowledge and political power'.* Knudsen (1995) suggests that while the need for '*an integrated approach and community participation is recognised and espoused'* (Woodhill and Roling 1998), within the Murray–Darling Basin Commission these values do not accord with its administrative structure or power base and, as a result, the practice does not match the rhetoric.

The physicist Fritjof Capra (1997) explains that the paradigm shift from a reductionist/mechanistic worldview to an ecological view requires an expansion of perceptions, ways of thinking, and values which can cause a '*crisis of perception'*. The conceptual shift appears to be as difficult for some technocrats today as it was for classical physicists in the 1920s when the introduction of quantum physics made them '*painfully aware that their basic concepts, their language, and their whole way of thinking were inadequate'.* The transition to an ecological worldview appears to have generated insecurity within the natural resources management industry resulting in cases of attrition *('Lord make us truly green – but not just yet'* : Sterling 1993), promotion of pre-ecological values, exclusion, and backlash against perceived threats:

> *… the scientific/technocratic/managerial paradigm … is not a neutral, detached, objective process but is highly political. Its politics are those of preservation of the status quo … of 'dynamic stability in the face of change'.*
>
> Robottom and Hart 1993

Woodhill and Roling use the analogy that the socio-cultural and the biophysical aspects of ecologically sustainable development are like the two wings of a '*sustainability eagle'* which has not been able to take off to date because it has only been flapping its technological '*wing*' to address biophysical symptoms in the landscape. If the 'eagle' is not to continue to flap in circles on the ground, its socio-cultural wing must be strengthened (through community capacity building, new perspectives, and allocation of resources) to match its technological wing.

Conclusion

Changes in perspective can sometimes facilitate solutions to apparently insurmountable problems (Eastburn 1999). Gaining broad acceptance that 'environmental problems' are primarily sociocultural or 'people' problems caused by cultural practices and structures will

enable the issue of sustainability to be elevated from the technical domain to the realm of power and social relationships. The general public will then be able to respond to the issue from their knowledge bases rather than simply reacting to something which is apparently out of their control. It is essential that all Basin residents are involved in activities to enable them to deal with the impacts of resources degradation, to become effective partners with governments, and to participate in the transformation to a sustainable society.

Managing water resources in Australia for a sustainable future requires a combination of scientific understanding, political will, social critique and social transformation.

Discussion notes

- Increased water flows are needed for the environment. Future environmental flows (EFs) will depend on the community deciding how much extraction (and thus impact) is acceptable. Those investigating the Snowy River recommended that 28 per cent of normal flows are needed by the environment
- There is no rule of thumb for environmental flows, as all rivers are different and it depends on the priorities of the features to be preserved in different sections of the river. EFs are decided on by expert panels, including community representatives. A recent study of the Murray River found that 66% of natural flows was required to satisfy environmental requirements. EF for the Moonie River (Qld) is 70%, and for Border Rivers (Qld) is 60%. Buying back water for the environment would cost many billions of dollars. In decision making processes, the rights of human exploiters clearly appear to have primacy over the rights (if any) of the environment
- The Murray-Darling system flows through four states and one territory, each with different jurisdictions, with the lowest down the track (South Australia) enduring the poorest water quality for domestic use. Only federal agreement and regulation, over-ruling the states, could ensure a favourable outcome from the environmental point of view, and this seems unlikely in the present political climate
- The imagery of the biophysical and sociocultural wings of the ‘sustainability eagle’ has much to say about the way in which our society operates. It is applicable to other aspects of environmental degradation in which so-called environmental impact statements are used to bamboozle sometimes apathetic public opinion. An example of one such local proposal is for the development of a charcoal industry in a pristine area on the south coast of NSW, supposedly to create ‘local employment’. The proposal runs against ESD principles in terms of creating large increases in greenhouse gas emissions both for the factory operation itself and for overland transport, loss of biodiversity, water supply stresses and local water and air pollution
- An important driver for the sociocultural wing is the mantra of ‘economic growth’, which mainly benefits the developers rather than the local community. In fact the community is often the loser in both ecological and economic terms, from loss of local amenity and the undermining of tourist development
- The ‘Special forever’ program for intergenerational equity, using primary school English classes to increase awareness of, and responsibility towards, the Murray Darling Basin surely has the potential for enhancing public opinion on other environmental issues. The education process needs to be addressed more widely, in view of the urgent need to prevent further environmental degradation.
- Confirmation that sustainability is ultimately a sociocultural issue contrasts with the overwhelming imbalance of resources in favour of the technical and administrative aspects of the Murray-Darling Basin and other development initiatives. Only the

elevation of the sustainability issue from the technical domain into the area of power, culture and social relationships will enable the 'sustainability eagle' to take flight.

Further reading

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