

## 22 Experiences with integrated river basin management, international and Murray Darling Basin: *lessons for northern Australia*

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Gariep Dam, South Africa. Completed in 1971, the dam supports irrigated agriculture in South Africa's largely semi-arid climate, as well as hydropower, recreation and municipal water use. Today, the focus of water management in South Africa has shifted to environmental sustainability, social equity and economic efficiency.

Photo: Erin Bohensky

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## 1. KEY POINTS

- Fragmented policy and management frameworks, which are the norm internationally and in Australia despite the National Water Initiative (NWI), have a low capacity to capture key principles of the NWI. The sustainability approach of the NWI accounts for the idiosyncrasies of the specific terrestrial hydrological cycle, sustains cultural values, adjudicates on equitable distribution and allows for efficient solutions to resolve the competing and conflicting demands of water interests.
- A major theme of the NWI is the importance of taking a whole-of-hydrological system approach to water policy. The approach is consistent with integrated river basin management, an aspect which is often ignored or overlooked.
- The management of the Murray Darling Basin has struggled to reverse the expansion of water entitlements and management practices that are contrary to sustainability principles. These have been consolidated as a result of uncoordinated incremental development over the past century. To avoid this risk there is a strong argument that development in northern Australia should occur within a well defined policy framework.
- The failure of international water management practices to reduce the decline in environmental conditions and resource security has focused attention on the benefits of adaptive management. Decision makers can take account of lessons learnt, improvements in scientific knowledge and work with a much wider range of stakeholders to increase support for reform.
- Promoting a culture of collaborative or co-management across the wide range of institutions that make decisions affecting water quantity and quality is essential for achieving better outcomes.
- A systems approach is necessary to link social, economic and environmental costs and benefits so they can be compared. Without a systems approach it is easy to ignore the social costs of policy or management failure that will be the responsibility of other organisations, other people or future generations.
- South Africa has developed water system management based on ecological and human reserves, similar in intent to the NWI. The system ensures that a basic water supply for human needs is satisfied before water can be assigned for any other uses. South African water policy reform highlights the primacy of social equity and basic human rights, which may take precedence over ecological sustainability.
- There are three noteworthy aspects of South African water policy:
  - According to Ecologically Sustainable Development principles, all activities are evaluated according to the effect on river flows and assessed accordingly: i.e. the primary objective is to maintain the accepted level of functional integrity of the water system
  - Basins are classed according to ecological classes from natural to critically modified. Management recognises that some basins are likely to be more modified than others

- The need to restore the inequitable assignment of historical water interests, where legitimate claimants have been denied access due to past institutional or governance arrangements.
- The challenges of viable water policies based on co-management principles are made more complex when basins are subject to inter-jurisdictional conflict, as evidenced by the Murray Darling Basin. Constitutionally all basin States act as independent sovereign entities.
- Inter-jurisdictional conflicts occur in three basins in northern Australia but are unlikely to be of major concern. The constitutional relationship between the Commonwealth and the Northern Territory means that any conflicts that do arise can be negotiated between the Commonwealth and the State, as opposed to State to State contestation.
- A potential exists for a closer working partnership between the Commonwealth and managers in the Northern Territory. The relationship could be used to trial implementation ideas which could then be proposed to the two States as evidence-based working models.

## 2. SUMMARY

Australia is the only developed country with a sizable area of its territory in the tropics. Its water governance arrangements should be designed to encourage highly creative responses to this unique situation. One approach to this requires the involvement of a much wider range of stakeholders than have been included in Australian water management in the past. Compared with other countries the Australian approach to water management has been more technical and managerial. It is notable that the European Union through its Water Framework Directive - the world's most ambitious water reform program - places much greater emphasis on the potential of civil society and public participation to shape water policy. Similarly, stress on the importance of consultation, education and public participation is a key feature of South Africa's reforms based on its 1998 Water Act and is also reflected in an emerging body of theory and practice about collaborative water management in the United States.

A major issue for rivers in northern Australia is the potential involvement of different hierarchies and scales of government. In general the management of rivers in federal political systems worldwide is characterised by intergovernmental and interagency conflict, low levels of decision making transparency and accountability, high transaction costs and ad hoc deals between competing government agencies that undermine best practice water management. A notable experiment is CALFED, an agency set up to act as a consortium to coordinate the activities of the state of California and the USA federal government in the San Francisco bay area, the delta for the Sacramento and San Joaquin rivers. Its management involves a wide range of industrial, agricultural, urban, environmental and other issues that involve over 20 million people who draw water from its feeder rivers.

In 1994 chaotic conflicts between the many agencies, commercial interests and other stakeholder groups involved in water policy in central California and the San Francisco Bay region caused the federal and state governments to establish CALFED to coordinate policy and management traffic in 1994. Its history since then, however, shows how difficult it is to establish an effective presence in that institutional space. Many critics have charged that it has not fulfilled its planned go-between role. Instead it has become just another agency fighting for turf at the expense of its rivals. But the rationale and objectives underpinning the establishment of CALFED continues to exist, both in California and elsewhere subject to a federal political structure. Its history demonstrates that it is very difficult to achieve effective poly-centric coordination. This and other accounts of limited success in organising such processes shows that governments should assign a high priority to the design of coordinating mechanisms and the institutions through which they will operate.

Examples from a number of regions show that it is important to create a robust decision-making system early, before alternatives become consolidated. The Murray Darling Basin is a case in point. Failure to implement a well designed institutional foundation resulted in the growth of a highly dysfunctional system focussed on the parochial needs of four largely autonomous state governments. The problem was recognised by the first generation of decision makers who attempted to create a whole-of-river framework for the River Murray based on the Interstate Commission (before it was blocked by the High Court in 1915) but the forces in favour of state isolationism were too powerful. The damage was compounded by state governments promoting the growth of powerful stakeholder groups who became dependent on unsustainable levels of extraction causing them to become determined opponents of water reform in the late twentieth, early twenty first century.

This history highlights the importance of institutional design but also points to the need for carefully crafted incentives and stimuli that effect both cultural change and influence behaviour and outcomes. The United States is just one country where there has been a significant shift towards

collaborative approaches to catchment or watershed management in recent years. This was the product of a number of factors – increased interest in alternative dispute resolution instead of litigation, dissatisfaction with the implementation of the Federal 1972 Water Pollution Act, particularly regarding non-point source pollution, and a growing concern that much environmental legislation was not democratically legitimate.

In the period immediately preceding the 1990s there was an increase in litigation in US courts, with mixed results. The US legal system is the ultimate forum where the characteristics of disputed rights are revealed: it is the property rights elephant graveyard. Legal decisions tended to focus on procedural not substantive issues and efforts to avoid litigation on the part of agencies or companies were minimalist in their approach. Further, with many stakeholders thinking they could 'win', the litigious atmosphere this created discouraged the cooperation necessary to solve complex issues where the law was not sufficiently clear. In the recent, more collaborative era, the law still plays a role in that failure to agree will mean expensive protracted court proceedings with unpredictable outcomes. Often in such situations a combination of education, commitments to change behaviour, and voluntary agreements to share costs and benefits along with publicity for those who do not cooperate, has shown more promise.

Compared with past practice this collaborative approach has a number of novel features. To a significant degree all stakeholders treat each other as equals even though there may be substantial differences in power and knowledge. Local knowledge is also given a higher status than has been usual in the past. The collaborative approach has its critics, however. Some environmental groups argue that major changes in, for example the assignment of water rights, water allocations or other reforms that will significantly impact on stakeholder interests get scant consideration in a consensus driven process that tends to treat all interests as equally worthy.

Analysis of what is required for effective stakeholder participation in water management has been undertaken most thoroughly in the context of the European Union's Water Framework Directive. The goal is to restore all major hydrological systems in the European Union to high ecological status by 2015. The unit for policy and management is the river basin and with its emphasis on the need to manage across both political and institutional boundaries the Water Framework Directive has many similarities with Australia's National Water Initiative's whole-of-hydrological system approach. Unlike the National Water Initiative<sup>62</sup> however, the Water Framework Directive emphasises the value of public participation and an active engaged civil society. Much of the theory and nine case studies in nine countries are analysed in detail in the reports of the European Union's HarminiCOP program.

In broad terms there are three ways to implement change. The first is by escalating force, graduated sanctions and negotiation under coercion at the direction of governments. The second is through trade (the market). The third is through deliberation, education and collaboration. The Europeans use all three but they place a very strong emphasis on the potential of the third element using the term 'social learning' or 'sustainability learning'. The social learning approach of the European Union aims to create cooperative relationships expressed as new attitudes and behaviour towards the environment. In terms of the aims of its proponents it is not just about solving particular technical problems and achieving specific policy goals. The importance of public education about water and the environment is a major theme. People are encouraged to meet often in constructive circumstances in order to develop positive relationships which can then affect the way in which they jointly resolve water management problems. Governments are encouraged to involve stakeholders early in the planning process and provide substantial support to their joint activities. The list of objectives is impressive (although there is no doubt that even in the best examples reality falls far short of articulated objectives).

A substantial section of the National Water Commission's 6<sup>th</sup> Waterlines report published in April 2008 and titled 'Water allocation planning in Australia – current practices and lessons learned' discusses these themes and argues that increased public participation in water planning would improve water planning and lift community support for reform. The report also explains that there are ways of organising public participation so that the danger of creating 'talk shops' is avoided. That is also a theme in the international literature along with the need to achieve results to keep volunteers engaged.

### **3. INTRODUCTION: TOWARDS MORE PARTICIPATORY, COOPERATIVE AND LEARNING INSTITUTIONS**

In this chapter we identify several challenges in designing and operating successful institutions for managing water resources. By drawing on local experiences from the Murray Darling Basin (MDB) and international examples we propose several principles that can be applied in developing strategies to improve the effectiveness of water institutions, with particular reference to northern Australia.

The key challenges include:

- A propensity for incremental decision-making, and lack of attention to uncertainty in both hydrological and social dimensions
- Balancing inclusive and technical needs of water planning and assignment
- The fragmentation of water management roles, responsibilities and rule-making across boundaries; and
- Assumptions about the efficacy of markets to realise social and ecological benefits.

To address the institutional inertia these challenges can generate, this chapter explores the contribution of several principles (in theory) and strategies (in application) with examples of their practice in Australia, Europe, South Africa and North America. These include:

- Clarifying the foundational rules and objectives of water institutions
- A policy and operational culture of adaptive management and social learning
- Improved integration and mix of policy instruments: sanctions, markets and engagement, and
- Support for greater participation of diverse interests and organisational cooperation.

The chapter concludes with insights on implementing such principles in the context of a systems approach and charts some lessons for water institutions in Northern Australia. The first section however looks to experiences of southern states and the MDB.

## 4. PROBLEMS OF THE MURRAY DARLING BASIN AND LEARNING FROM THE PAST

*In recent decades the Murray Darling Basin has struggled to reverse unsustainable entitlements and management practices that were allowed to grow and become consolidated as a result of uncoordinated incremental development over the past century. To avoid this risk there is a strong argument that development in northern Australia should occur within a well defined policy framework.*

A constant refrain heard often in northern Australia is that we want to avoid the mistakes of the Murray-Darling Basin. But what were those mistakes? How were they made? We can all see the results but how did we get here? What made them mistakes and how applicable are the lessons elsewhere? The following pages discuss five issues which may or may not be mistakes but which have been central to the history of development in the MDB. The first of these is discussed below with the remainder addressed at the conclusion of the chapter.

These are:

- The failure to put in place a basin wide decision making system early in the twentieth century before a States focussed system became consolidated;
- The difficulty involved in attempting to implement a systems based approach to policy and management as required by the NWI;
- Resistance to accepting the NWI imperative that the needs of the ecological system should be established before water is made available for production;
- The highly contested role of markets as the drivers of reform; and
- The importance of public participation.

### 4.1 The costs of early failure

It is apparent through our review of the history of the MDB that a high price has been paid for not establishing a robust, basin wide, decision-making system in the early twentieth century. It is important to establish a comprehensive cross border framework at the beginning of the development process because once stakeholders' organisational structures and rules are entrenched they are very difficult to influence and reconfigure. The incremental governance path, characterised by the accretion of small, often inappropriate decisions; results in the extraordinary cultural and institutional inertia that features in most water management systems. In subsequent years the legacy of prior commitments and the evolution of vested interests impede change no matter how strong the arguments for reversal. Once the incremental path has been chosen it becomes very difficult to exercise strategic direction over the path of events.

A decision that needs to be made at the beginning of the water development process for a new region such as northern Australia is whether to put in place a comprehensive structure for policy and management at the start of the process or whether it is better to develop the decision making framework incrementally in response to revealed needs. Even this incremental approach differs from one characterised by adaptive management where goals or 'endpoints' are defined at the beginning, even if the operational pathways are adaptive.

The history of irrigation development in the MDB indicates that it would have been best to put in a comprehensive structure at its inception. In the MDB, the incremental option has shown itself prone

to capture by the stakeholder interests that have become dominant as development has intensified. This is significant given that the need for reform has often been in response to problems caused by their activities. The result of their dominance of the redesign process is that there is continual pressure to protect their interests to the greatest degree possible. Arguably this was a major cause of the eventual failure of the reforms of the 1980s and it provides the most serious threat to the current reform effort now getting under way with the implementation of the Commonwealth Water Act 2007<sup>57</sup> and the development of the MD Basin Plan.

It is of course quite legitimate for stakeholder groups to protect and promote their own interests. Ideally this should happen, however, within an institutional framework that can also take account of the wider interests of society and other issues such as the need to preserve the level of accepted ecological integrity of the river system as required by the National Water Initiative. In the case of the MDB the 'stakeholder interests' have cohered around the New South Wales, Queensland, South Australian and Victorian State governments.

#### **4.2 Foundation phase of cross border management in the MDB (early 20<sup>th</sup> century)**

The initial 1915 plan for cross border decision making in the MDB was centred on the Interstate Commission. It would have provided a decision making framework that combined the capacity to make major difficult decisions from a River Murray basin-wide perspective that could transcend state borders with considerable decentralisation and autonomy at the sub catchment level (in accordance with the principle of subsidiarity). Instead, state interests, particularly in New South Wales, have been able to insist on minimal cooperation and maintain a state orientated sub-basin focus for decisions about most issues ever since. As a result three separate foci for stakeholder interests became consolidated and able to frustrate many of the whole-of-basin type reforms attempted in recent decades.

It can be argued that these three largely autonomous zones would not have developed if the original plan for the cross-border management framework for the River Murray had been put in place. The first phase of cross border water management was consolidated in the early twentieth century. Initially the River Murray Waters Agreement and the River Murray Commission – the framework and organisation that managed cross-border water issues in the southern MDB until the 1980s - were designed to operate in combination with the Interstate Commission which was originally meant to be a major part of the Australian Federal system. These plans were frustrated, however, by a High Court decision in 1915 that stripped the Interstate Commission of most of its powers. According to Clark<sup>59</sup> without the Interstate Commission 'the River Murray Waters Agreement was a totally inadequate vehicle to impose a management regime for the whole Basin'.

#### **4.3 1980s – the second attempt to create a strong decision making system**

Despite the failure to put in place a comprehensive system for decision making in the early twentieth century cross border water management in the MDB was relatively successful for a number of decades. Before the locks and Hume Dam were built there were a number of years when River Murray water was too salty to drink – 1902 and 1914 to name two. After the major storages were built, however, river salinity was managed successfully until the 1960s. But by the early 1970s it once again became a serious concern. In response, cross-border arrangements were restructured in the 1980s. The new framework was incorporated in a revised MDB Agreement which for the first time included Queensland and the Australian Capital Territory although not as fully committed signatories. Key elements were the Murray-Darling Basin Ministerial Council, the Community Advisory Committee to the Ministerial Council, and the Murray-Darling Basin Commission.

All three bodies were supported by the Commission Office. The reforms reflected changing ideas about how public institutions should be organised and operated. There was a wide spread feeling that decision-making could no longer be left to small groups of engineers who had spent their careers dealing mainly with water resource infrastructure. Under the new institutional arrangements the Basin's river system was to be managed to jointly improve biodiversity and sustainability as well as production. The States and Commonwealth governments sent teams of ministers and senior public servants drawn from the agencies that dealt with these often conflicting responsibilities. This brought the environment and agriculture into the institutional fold along with water management.

In principle, given the inclusion of at least two ministers from each of the governments represented on the MDB Ministerial Council the new arrangements should have been able to make decisions for the MDB as a whole about the major issues such as salinity and over extraction. However, most of the activities incorporated into the new agreement were advisory or discretionary in nature and needed the enthusiastic cooperation of all governments and agencies involved before they could be implemented in any significant way. This applied particularly to activities outside the River Murray corridor. In addition, the long established unanimity principle still applied to all decision-making processes giving the power of veto to any jurisdiction that wanted an item excluded from the agenda or which was dissatisfied with any decision made. Despite these limitations the early years of the MDB Initiative were marked by widespread enthusiasm and considerable achievement.

#### **4.4 What went wrong?**

On a number of occasions before he retired as Chief Executive of the Murray-Darling Basin Commission in 2002, Don Blackmore publicly reflected on the adequacy of the inter-jurisdictional arrangements in place in the MDB<sup>60</sup>. In 2001, speaking as a contributor to the Australian Broadcasting Corporation's Alfred Deakin lecture series Blackmore commented that it will not be possible to invariably resolve problems with 'win-win outcomes for all states'. This statement had a number of implications. First it suggested that in the past to be successful, as a result of the threat of veto accorded to the Murray Darling jurisdictions, any proposals had to be designed so that all parties gain something they could immediately present as a victory to their home constituency. Each negotiation considered in isolation had to result in every participant being able to claim a significant benefit. It had not been sufficient for a jurisdiction to do well on balance, all things considered, in the medium term. This effectively excluded decisions where there might be overall benefit for the region as a whole but at some short-term cost to any one jurisdiction. Similarly, if the final outcome of negotiations had to benefit all jurisdictions every time it also excluded the righting of wrongs where one jurisdiction has been badly treated to the benefit of another. This unworkable situation was the product of the requirement that all decisions had to be unanimous. The introduction and eventual ratification of the *Water Act 2007*<sup>57</sup> was the Commonwealth's initiative to resolve the deadlock.

#### **4.5 Now – the third attempt**

The new arrangements involved a very substantial shift of policy power to the Commonwealth Government. The Murray Darling Basin Commission was replaced by the Murray Darling Basin Authority which in addition to the responsibilities for water sharing between the states and a range of programs such as those dealing with water salinity previously exercised by the Commission was also tasked to prepare a Basin Plan by 2011. Previously the central MDB framework had dealt only with a limited range of issues agreed upon through a voting process requiring unanimity. The Basin Plan<sup>58</sup> is to be comprehensive and deal with all issues that threaten environmental conditions and resource security with a catchment wide perspective ignoring state borders. It will be implemented by 10 year sub-plans that will be developed by each of the states in the MDB. They in turn will shape

the various regional and sub catchment plans within their areas of jurisdiction. Backing the Basin Plan will be substantial Commonwealth payments for State compliance.

Nearly six billion dollars of the funding is to support the upgrading of water distribution and irrigation infrastructure in the MDB to equip the region to respond to the challenges predicted to result from climate change. The *Water Act 2007* goes into considerable detail about how this money is to be spent. It states that it should only be allocated after rigorous assessment focusing on how best to prepare for a very different climatic future. The existing distribution of irrigation (which uses 95% of water extracted in the MDB) reflects expansion which occurred in the wet decades leading up to the 1990s. Understandably those communities would all like to upgrade infrastructure to protect them to at their current level of development. Predictions for the future suggest much drier and more variable conditions. This could mean different agricultural activities in fewer places than now. The battle between these alternate visions of the future is becoming intense with many communities seeing this as a fight for their very existence.

In addition just over three billion dollars has been allocated to buy back water that will be used in key regions to halt the decline in environmental conditions. This too is strongly contested even though water is only being bought from 'willing sellers'. An underlying premise of the case for reducing extractions in basins where they are causing decline in environmental conditions and resource security is that a reduced level will protect living conditions and the economic activity that is dependent on them. Against this some critics claim that reductions will cause communities to shrink because the amount of irrigation in their areas will be reduced. Similarly, they argue that a reduced number of irrigators will have to pay for the same level of delivery that previously supplied a larger volume of water to a larger number of irrigators. At a more fundamental level there is still wide spread opposition – often not publicly expressed - to shifting water from irrigation to the environment. There is also concern about the impact on water prices of large scale government purchasing programs<sup>61</sup>.

Central to the new arrangements is the role of the Commonwealth Minister designated with the responsibility of approving the Basin Plan, the state sub plans and many related decisions albeit subject to advice from the MDB Authority and the new MDB Ministerial Council. But what would happen if the key Minister was part of a government that was aggressively pro-agricultural development, sceptical about predictions of climate change and unsympathetic to sustainability and environmental perspectives? Additionally, the continued action of regional or state based interest groups threatens to undermine the successful management based on whole-of-basin perspectives. The new arrangements are based on the referral of powers from the states that can be revoked.

Despite what a basin-wide perspective might suggest, the Commonwealth and State parliaments are comprised of members from the relevant MDB states and when pressed both can be expected to aggressively lobby for parochial MDB interests. It can be argued that there is nothing in these new arrangements that would make them more resilient than previous arrangements if similar tensions emerged once again - as could easily happen if the MDB Authority produces a draft Basin Plan that would involve significant political costs to one of the State governments. The *Water Act 2007* explicitly excludes any penalties from being imposed on non compliant state governments apart from the withholding of funds. That strategy was tried with mixed success in 2005 when National Competition Policy payments were reduced in response to that state's poor record in implementing water reforms. Consequently it would seem that the provisions for pressing the States to cooperate with a basin-wide perspective are no stronger under the new arrangements than they were under the 1980 arrangements.

There has never been an official inquiry into why those earlier efforts were not successful. In the case of disasters such as bushfires and air crashes an analysis of what went wrong is mandatory. Policy and institutional failures are examined more rarely, however, even though the consequences are often much greater. Given this, a systematic study of the history of policy and institutional innovation in the MDB - and the reasons for successes and failures - should be given a much higher priority if we want to reduce the future influence of the malign factors that have shaped the past.

One conclusion that is strongly suggested by the historical record is that the cost of not putting in place at the beginning of the development process institutions that could make major decisions from a basin wide perspective has been very high.

From here the chapter discussion moves from domestic experiences in the MDB to exploring possible responses to some of the issues raised above. It does this by examining international experiences.

## 5. MANAGING FOR UNCERTAINTY

*In recent decades there has been increasing acceptance that traditional water management practices have been causing decline in environmental conditions and resource security in many hydrological systems. This has focussed attention on the benefits of adaptive management so that decision makers can take account of lessons learnt, improvements in scientific knowledge and work with a much wider range of stakeholders to increase support for reform.*

In recent decades a conceptual shift has begun to occur in river basin and water resource management in many regions around the world. This shift challenges the once-prevailing view that water resources could be managed through technological interventions, so as to minimise variability and unpredictability, and provide a steady stream of benefits to society. This style of 'command-and-control' management is predicated on the idea that resources are controllable and any unexpected outcomes can be dealt with further layers of control<sup>1</sup>.

A major problem with this approach is that water resources are in fact embedded in complex systems, characterised by uncertainty, non-linearity and adaptability to change<sup>2</sup>. Attempts to control dynamics that are largely uncontrollable have tended to result in unintended consequences. Damming of rivers and attendant flow stabilisation is one example: secured water supplies have transformed numerous aquatic ecosystems, with concordant reductions in ecosystem functionality leading to losses of biodiversity and some non-provisioning ecosystem services<sup>3</sup>.

With increasing awareness of these losses – which are not only ecological but economic, social and cultural in nature – changed water management paradigms have emerged. In some places this was accompanied by the recognition that water system decision-making is sometimes most effectively accomplished by those dependent communities in closest proximity to the resource. This implied a change in the knowledge base from which water management has been historically drawn, from one that is solely scientific to one that reflects the values and aspirations of a wider distribution of stakeholders. Together these changes pointed to a need to develop approaches and institutions that recognise the inherent uncertainty of water resources, and consequently, the need for learning and adaptation as part of the management process.

Adaptive management is based on the goal of increasing the adaptive capacity to learn from and better cope with uncertainty affecting water resources as opposed to seeking optimum solutions<sup>4</sup>. Sometimes described in simplest terms as 'learning by doing,' adaptive management treats policies as experimental hypotheses that are tested through implementation. Scientific or technical adaptive management that focuses on experimentation and co-management that emphasises stakeholder involvement are two variants identified in the adaptive management literature. Some advocates

prefer a blend of both, encompassing collaboration, experimentation and a bioregional approach to resource management<sup>5</sup>.

Adaptive co-management approaches emphasise the role of community in decision making, accounting for a diverse range of values and views, shared or social learning and recognising the sources of adaptability, renewal and transformation towards adaptive governance<sup>6, 7</sup>. A flexible system of governance arises, capable of tailored responses to specific circumstances, supported and conditioned by affected interests at variable scales (*ibid*).

### **5.1 NeWater (New methods for adaptive Water management under uncertainty)**

The European NeWater (*New methods for adaptive Water management under uncertainty*) initiative recently concluded after four years of activities in seven river basins in Europe, Africa and Asia. NeWater sought to develop a conceptual framework to transition from current management approaches to ones that embrace learning and adaptation, as well as tools for practical application in specific case studies.

Questions of interest to NeWater included<sup>8</sup>:

- (1) What types of uncertainty need to be taken into account in water management?
- (2) How does adaptive management account for uncertainty?
- (3) What are the characteristics of adaptive management regimes?
- (4) What is the role of social learning in managing change?

Insights from these case studies are emerging as to the suitability of adaptive management approaches to river basin management, and how institutional and other features support adaptive management.

The thinking that underlies such approaches is not ubiquitous. Many river basins are trapped in a path dependence due to sunk costs in prior paradigms, infrastructure, and existing practices<sup>9</sup>. One of the NeWater case studies, the Hungarian reaches of the Tisza River Basin (HTRB), examined what can be done when such a situation creates barriers to learning and adaptation. The HTRB suffers from a deeply entrenched water management system and decades of ecological, social and economic decline. By one account<sup>10</sup>, the HTRB is “trapped in a hopeless downward spiral of coping reactions that never build enough initiative to adapt and improve the situation” and a continuous cycle of crisis management. For several decades, a “shadow network” of scientists and local activists both in and outside of government has slowly grown in Hungary to discuss and understand this management trap and how it is perpetuated by the links that reinforce the current river management regime. This loose, informal alliance offers alternative visions and methods, supported with field experiments, to those that dominate the national agenda.

While the higher levels of government ministries are represented in the network, water policy still emanates in a top-down fashion from Budapest rather than proactively from the bottom-up. Through the shadow network, conceptual modelling tools have been introduced to aid deliberative processes, and concepts such as resilience, adaptive capacity and vulnerability were incorporated into a new paradigm that aims to “live in harmony with the river” and support a range of ecosystem services, as opposed to the conventional aim to “protect the landscape from the river.” Increasing acceptance and use of this new paradigm in other basin states and recognition in European-wide policies are

providing compelling evidence of the value of informal and formal dialogues among inhabitants and managers of the HTRB as well as Hungary as a whole.

A number of studies have investigated factors that support aspects of adaptive management and related approaches to deal with uncertainty in water management. Research conducted as part of the European Water Framework Directive<sup>11</sup> explored the role of national cultural factors as co-determinants of participation in Integrated River Basin Management in European trans-boundary river basins. Factors were the degree of equality in a society, individualism/collectivism, masculinity (degree to which society reinforces traditional male roles of power), uncertainty avoidance, and long-term orientation (degree to which society embraces tradition versus forward-thinking values)<sup>12</sup>.

Cultures that are characterised by high levels of inequality and masculinity were found to be unlikely to embrace public participation, while collectivism facilitates an increased degree of public participation. Informal processes are likely to dominate when inequality is high. High inequality and uncertainty avoidance inhibit public participation because they support centralised and control-oriented systems of water management. Where there is a higher perceived environmental risk (e.g., droughts and floods), there has been a longstanding recognition of the importance of public participation and institutionalised systems for the collective management of water resources (*ibid*). It has been observed that some institutional settings may be too inflexible and constraining to enable adaptive management. One NeWater project<sup>13</sup> developed a framework to better understand which institutional factors contribute most to enhancing adaptive capacity in trans-boundary river basin management. These factors were related to actor networks, policy processes, information management and legal and financial aspects. When this framework was applied to the Rhine river basin in Western Europe, it was found that many elements of an adaptive river basin regime can be developed, while this was less so in the Orange river basin in southern Africa, where the general institutional and political contexts currently constrain capacity.

The dynamic nature of these contexts and the regimes themselves are noted, however, as are the long timeframes - a decade or even a century - needed to achieve a change. Indeed, adaptive management may not always be appropriate. Adaptive management can be very costly; cooperation and integration can impose high transaction costs<sup>14</sup>, as does information gathering and collation<sup>15</sup>. In situations where uncertainty is not particularly great, the costs of adaptive management may outweigh the benefits. More often, major transformation processes may be needed, when the structural requirements for adaptive management, such as adaptive institutions and a flexible technical infrastructure, are lacking.

To understand adaptive management as an approach to respond to uncertainty related to water resources, it is useful to contrast it to Integrated Water Resources Management (IWRM). Some confusion attends IWRM, what it means and how it is related to adaptive management, if at all. A review<sup>16</sup> of these two concepts and empirical evidence of these approaches explores this confusion and its possible causes. Integrated water resource management (IWRM), first mooted in 1977 at the UNESCO Water Conference, pursues the integrated and coordinated management of water and land as a means of balancing resource protection while meeting social and ecological needs and promoting economic development<sup>17</sup>. It is very much focused on balancing of goals and views of stakeholders; however, there seems to be a reluctance to agree on a definition of IWRM and to specify mechanisms to achieve it. This may reflect a preference for IWRM to be context-specific, but it has led to an excess of definitions and understandings of what it is. Furthermore, it contradicts itself in purporting to be holistic, but having water – rather than all resources and their inter-linkages – as its central focus. Examples in Canada demonstrate some success with IWRM approaches, but owe more to historical context for success<sup>18</sup>.

Much of the current interest in adaptive management concerns social learning processes. The European HarmoniCOP project reviewed nine participatory river basin initiatives<sup>19</sup> and identified the following key themes that fostered or hindered social learning: the role of stakeholder involvement, politics and institutions, opportunities for interaction, motivation and skills of leaders and facilitators, openness and transparency, representativeness, framing and reframing, and adequate resources. The most important factor for fostering social learning was found to be the engagement style of the organiser of the participatory process; it was important the organiser demonstrated continued high motivation and engagement, with high technical competence and personal qualities, so as to establish and maintain his or her legitimacy. The lack of clarity about the role of stakeholder involvement was found to be the most important factor hindering social learning. Political and institutional settings that support participatory processes were also highly important.

## 5.2 Thresholds of Potential Concern, Kruger National Park, South Africa

Since the 1990s, scientists and managers in the Kruger National Park have worked to develop a strategic adaptive management framework<sup>20</sup> based on the concept of Thresholds of Potential Concern (TPCs). First developed as part of the park's rivers research program, TPCs now exist for all dimensions of biodiversity conservation. TPCs are a set of operational goals that together define the conditions for which the Kruger ecosystem is managed across space and time. Expressed in the form of indicators of upper and lower levels along a continuum of change, TPCs act as 'amber lights' to warn of a possible change. Slowly-changing variables are a critical component of the TPC framework, as these variables, such as geomorphic diversity, can have a strong influence on biodiversity and the ability of park managers to meet operational goals. As part of a long-term monitoring system that is linked to management, TPCs are embedded in an adaptive decision-making loop that allows feedback between management actions and monitoring. Importantly, the TPC framework encompasses an objectives hierarchy that recognises value change<sup>21</sup>. Objectives and hence TPCs must be consistent with one another, but are adapted as necessary. The TPC concept has been extended to other applications such as monitoring of rangelands in Southern Africa.

## 5.3 Scenario planning

Scenario planning is a widely-used approach to stimulate thinking about uncertainty in complex systems, drawing on different knowledge and perspectives of the future<sup>22 23</sup>. Originally used in military applications, scenarios became popular in the business world and beyond through the highly publicised success of Shell Oil in the 1970s<sup>24 25</sup>. It is well-suited to situations in which uncertainty about the future is high, and in which drivers that influence the future are largely beyond the control of managers, such as global climate and economic change. Scenario planning is therefore different from, but may complement, adaptive management, which is also well-suited to situations of uncertainty but in which the drivers of interest are much more controllable. As a participatory process, scenario planning seeks to engage those who can make decisions about the future in a process to learn about complexity. Scenarios allow assumptions to be challenged, and consider consequences of alternative trajectories and branch-points. Scenarios themselves are internally consistent, plausible storylines about how the future may unfold. There are a range of methods for developing scenarios, and they may be qualitative or quantitative in form, giving them a larger degree of flexibility, transparency and accessibility than other modelling methods. Scenarios have been used to identify and evaluate alternative trajectories for river basins or other large ecosystems in South Africa<sup>26</sup>, Tanzania<sup>27</sup>, Europe<sup>28</sup>, the US<sup>29</sup> and Australia<sup>30</sup>. Some of the benefits of these processes have been to encourage strategic thinking and planning on longer time horizons, to empower stakeholders in articulating future visions, to evaluate the possible outcomes of management interventions, and to provide more robust assumptions for modelling.

## 6. COOPERATIVE AND COLLABORATIVE APPROACHES TO GOVERNING WATER

*Promoting a culture of collaborative or co-management across the wide range of institutions that make decisions that affect water quantity and quality is essential for achieving better outcomes.*

Contemporary water planning and development faces the challenge of a fragmented management system with many and often competing organisations involved in river basin management, each with its own interests and functional focus. At the same time there is growing recognition by water managers of the diverse interests and values of different stakeholders. Traditional water planning and management regimes have struggled with both these problems. A recent assessment of river basin management and development by the International Water Management Institute, for example states:

*Decision-makers should not infer from the integrated water resources management message that river basin management needs a strong centralized organization. Basins facing complex problems of conflicting societal values and pressure on resources will probably not be well managed by a single body...*

*Moving toward sustainable river basin management requires much more emphasis on developing, managing, and maintaining collaborative relationships for river basin governance, building on existing organizations, customary practices, and administrative structures.*<sup>31</sup>

Typically organisations with roles in river basin management tend to focus on particular tasks linked to their main function, for example, technical assessment and modelling, compliance, stakeholder engagement and social assessment, ecosystem management, monitoring or policy coordination. Often these roles and functions are inherited or spread across groups or organisations within river basins because of historical program arrangements or statutory responsibilities. With a greater number of organisations involved, so the greater potential for inter-organisational conflict and fragmentation. It is this conflict between organisations engaged in devising and implementing water policy that collaborative governance can help address.<sup>32</sup>

*Cooperative* approaches to integrated river basin management rely essentially on two complementary strategies. The first is a commitment to a process of consensus building and negotiation between interests, and the second, organisational coordination or partnering. These strategies are claimed to improve the level of integrated problem solving in terms of mutually acceptable outcomes and lessening the effects of jurisdictional, legal and regulatory complexity. *Collaborative* approaches, which place a strong emphasis on consensus-based process, generally have highly diverse interests participating in management, with an equally high degree of interdependence between those interests in the search for solutions<sup>33</sup>. Multiple interests requires methods to learn how to cope with and take advantage from difference, diversity and divergence<sup>34</sup> while moving towards a common understanding of problems, direction and set of decision-making rules<sup>35</sup>.

Collaboration can also sit alongside other ways of managing, that is, it does not necessarily exclude traditional representational or technical decision-making processes. Instead it can provide an alternative pathway for interests to navigate the planning process, breaking deadlocks. In cases of larger scale collaborative efforts in the US it can actually facilitate a more effective design and implementation of regulatory arrangements as part of a broader implementation agenda<sup>36</sup>.

Collaboration may take a variety of forms such as:

- ‘Policy level’ networks;
- ‘Organisational’ collaborations that work through aligning budgets, programs and management responsibilities between groups; and,
- ‘Action level’ cooperation amongst stakeholders that seeks to implement change through direct action (e.g. restoration activities)<sup>37</sup>.

They can also be differentiated by membership or mix of government, citizens or private sector players involved<sup>38</sup>.

Cooperative governance also includes *partnerships*, *co-management* and *co-regulation*. Compared to multi-party collaboration, partnerships are sometimes described as discrete relationships between governments, civil society and market players and include:

- ‘Co-management’ arrangements between the state and community;
- Public-private partnerships between the state and the market; and,
- Private-social partnerships between communities and market actors.

Ideally these work by seeking to address the weakness of one partner whilst building upon the strength of the other to deliver specific management or governance objectives<sup>39</sup>. Partnerships have also been criticised at times for being exclusive in their membership or when power imbalances between partners are left unchecked. What is shared by these different approaches to cooperative governance is that each one tends to be tailored to its particular problem and location setting and flexible in changing its structure, membership or mode of operation overtime to suit changing circumstances.

A partnership or collaboration can be a short term or loose coalition around a specific issue, project or development or a more permanent arrangement based on more formalised agreements for a given management area or objective. For example co-regulation in irrigated agriculture has involved the development of agreements between agricultural industries and governments on mutually acceptable standards of management practice<sup>40</sup>.

Cooperative efforts are also seen as a way to establish new networks that increase the distribution of knowledge among these players, including knowledge of each other’s needs and capabilities<sup>41</sup> and allow for different knowledge (local, scientific, traditional) to be debated and validated. From an individual or interest-based perspective collaboration does not ignore or override interests, but seeks solutions that satisfy multiple interests. From an organisational perspective a more cooperative, networked approach ought to compensate for potential skill and scope limitations of individual initiatives and contributors (e.g. allocation, engineering or stakeholder engagement).

## 6.1 Federal-State cooperation: some challenges

Few of the northern Australian rivers involve conflicts between stakeholders across borders so it may seem that there is little or no role for the Commonwealth government. However there are many situations where the Federal government has played a major role even though the area in question is confined in one state. The Barrier Reef is one example. National government become involved due to international treaty obligations and national interests and resource disputes that state governments have often struggled to manage. That said, situations involving more than one government are

particularly difficult to manage. In general the management of rivers in Federal political systems is characterised by considerable intergovernmental and interagency conflict, low levels of decision making transparency and accountability, high transaction costs and ad hoc deals between competing governments agencies that undermine best practice water management.

A notable experiment that would have been of great importance if it had been more successful is CALFED, an agency that was set up to act as a consortium to coordinate the activities of the state of California and the USA federal government in the San Francisco bay area, the delta for the Sacramento and San Joaquin rivers. With its feeder rivers the region supplies water to over 20 million people. Its management involves a wide range of industrial, agricultural, urban, environmental and other issues. Chaotic conflicts between the many agencies, commercial interests and other stakeholder groups caused the federal and state governments to establish CALFED as a clearing house coordination point in 1994. Its history since then shows how difficult it is to establish an effective presence in that institutional space. In essence the charge by its many critics is that instead of playing that essential but difficult go-between role it has become just another agency focussed on defining and protecting its turf at the expense of other government agencies with related responsibilities.

From a northern Australian perspective the point of this story is that it is important to investigate in great depth the issue of how best to coordinate the responsibilities of governments operating in the same geographical space because it is usually done very badly with substantial transactions costs, both in Australia and internationally. Further, investigation of this issue should involve careful examination of the historical record of institutional performance. It is routine to do impact assessments of new physical projects but it is rare to do the same for policy and institutional proposals even though the consequences – negative or positive - are potentially much greater in many cases.

## **6.2 South Africa's Catchment Management Agencies and Working for Water partnership**

The history of water management in South African has been significantly influenced by a semiarid climate, unevenly distributed natural resources, and the location of mineral deposits which encouraged settlement far from major water sources. The climate ranges from desert and semi-desert in the west to sub-humid along the eastern coastal area, with an average annual rainfall of about 450 mm, scarcely more than half the world average, while evaporation is comparatively high. As irrigated settlements began to dot the landscape along the Gariep (Orange) River in the early 1800s, water management was centralised, run by a bureaucracy, and favoured the agricultural and later, industrial sectors (see 'Command and Control,' above). Water rights became tied to land rights, entitling land owners to a share of the "normal" flow.

As the apartheid era drew to a close in the 1990s, the nation's leaders seized an opportunity to overhaul the previous water law and replace it with one of the most progressive pieces of water legislation in the world to date. The enactment of National Water Act No. 36 of 1998 signalled a commitment to ecological and social sustainability, abolishing all water rights except for two: the right of every citizen to an adequate, safe supply of water for domestic needs and the right of ecosystems to the water required for their continued functioning<sup>42</sup>. Together, these rights constitute the Reserve, the unconditional first priority in water allocation. The dramatic transformation that has been achieved in South African water policy has been attributed in part to a lengthy, extensive and genuine consultation and engagement process. It has invoked a complex discourse on social justice, equity, poverty and human rights, and the environment. Efficiency, equity and sustainability form the three pillars of the Act, reflected in its goal to provide "some, for all, forever"<sup>43</sup>.

The law promotes equity by its definition of water as a basic human right and guarantees provision of 25 L/d of safe water within 200 m of the home to all South Africans. Since the law was passed, equity in access to water has clearly improved: in 1998,  $12 \times 10^6$  people were without any access to formal water services and  $21 \times 10^6$  lacked sanitation<sup>44</sup>. By 2004, these numbers had decreased to about  $5 \times 10^6$  and  $16 \times 10^6$ , respectively<sup>45</sup>.

The Act promotes sustainability by protecting aquatic ecosystems through ecological reserve requirements, or environmental flows, and resource protection measures. The process of defining ecological reserve requirements is supported by a stakeholder-defined classification system. Water resources in each catchment are classified according to ecosystem services that stakeholders consider to be of value. Each water resource, typically a quaternary catchment or river reach, is assigned to an ecological management class to indicate its ecological condition. Classes distinguish resources on a continuum from mostly natural to critically modified to the point that their functioning may be impaired irreversibly. Management would strive, where possible, to restore resources to more desirable classes. Very low levels of risk would be tolerated for the most natural resources, while higher levels of risk would be acceptable for resources that are more heavily modified. These designations are decided upon systematically by a group of stakeholders who have knowledge of the system to be classified. Clearly, these designations are site-specific, and some quite uncertain, due to the lack of knowledge about relationships between hydrological flows and ecological variables. While this classification system acknowledges that some water resources must be sacrificial “workhorses” in order to allow others to remain pristine, it also provides for suggested improvements of resources that can lead to a reclassification upward.

Efficiency is promoted through licensing and pricing strategies designed to allow water to be allocated to the uses of highest value. Whereas financing for water management was subsidised by the government in the past, it is now to be achieved by full cost recovery (see below). Efficiency is very much linked to the equity and sustainability principles, in ensuring that scarce water resources beyond the Reserve are used for the collective benefit of the nation’s present and future generations.

Decisions as to how to best achieve these three principles has moved to a participatory arena. The Water Act mandates the establishment of 19 statutory bodies called catchment management agencies (CMAs) to govern water resources in conjunction with locally elected boards that represent a wide range of stakeholders. The CMA’s primary responsibility is for a water management area (WMA) that corresponds with major catchment boundaries, for which it can license water users and establish charges for different uses of water, the revenues from which will fund the CMA’s management activities. The CMA will also be responsible for implementing the appropriate resource protection measures to meet the requirements of the ecological reserve. In this decentralised decision making model, the national agency, the Department of Water Affairs and Forestry, remains the custodian of South Africa’s water resources and oversees its national strategy, the authority to execute the strategy will increasingly lie with the CMAs and local institutions within the catchment. Other notable aspects of South African water policy include the wide range of hydrological processes in the calculation of flows. Assessments take into account for the impacts on surface water runoff of groundwater, evapotranspiration, streamflow reduction activities (such as commercial afforestation) and invasive alien plants.

This broader view of water resources management underpins a high-profile integrated initiative known as Working for Water Programme. A partnership of multiple government agencies, Working for Water aims to halt the spread of invasive alien plants, which consume some 7% of the country’s total mean annual runoff and are expected to become an increasing threat in the future<sup>46</sup>. By hiring previously unemployed individuals to clear and eradicate invasive alien plants, Working for Water

addresses the multiple objectives of water conservation, ecosystem rehabilitation, and poverty reduction through job creation and the development of secondary industries from products made from the cleared alien species. Through its high visibility and public campaigns, the program has raised awareness about alien plants and water conservation among its employees, their communities and a broad spectrum of society, and also supports research on invasive alien plants<sup>47</sup>.

The mood in the South African water sector can perhaps be described as cautiously optimistic. There is at least some appreciation for the challenge of achieving and balancing the three principles of the Water Act (social equity, environmental sustainability, and economic efficiency) on the ground, despite wide acceptance and support for them on paper. Achieving social equity may be at a cost to environmental sustainability – both of which need to be defined<sup>48</sup>. The process to negotiate trade-offs is likely to require high levels of technical support, time and financial resources. Careful attention should be paid to how the implementation process unfolds in South Africa, particularly how the new institutions will get up and running and develop strategies to achieve these principles as appropriate to each water management area. There are several risks inherent in this process<sup>49</sup>. One is that CMAs may not be representative of all stakeholder interests, but will instead be dominated by powerful interests<sup>50</sup>, both within and external to the WMA boundaries. The second is that the new institutions may lack capacity to carry out their functions<sup>51</sup>, or may revert to the old practices of the Department of Water Affairs and Forestry in which they simply become regional extensions of the national department rather than reasonably autonomous entities<sup>52</sup>. In the interim period while CMAs are established, there may be a danger of non-action. Identifying and mitigating against these risks as early in the process as possible will be key.

### **6.3 Collaborative management in the Rogue River Basin, Oregon<sup>53</sup>**

The Rogue River Basin (57 000 km<sup>2</sup>) of southwest Oregon is renowned for its 'Wild and Scenic' white-water character and the habitat for endangered species such as the northern spotted owl and coho salmon. The basin has been extensively altered over the past 100 years from activities such as urbanisation, forest harvesting, road construction, mining, recreation and agriculture and suffers from the negative impacts of these activities. The focus of collaborative management in the Rogue River Basin was restoration of river ecosystems with goals to improve water quality, restore wild fish populations and improve habitat quality of riparian forest.

The State of Oregon supports watershed councils whose mandate and mode of operation is not dissimilar to integrated catchment management groups in Australia. The eight voluntary local watershed councils in the basin have formed the Rogue Basin Coordinating Council (RBCC) – roughly equivalent in scale to a regional NRM Body in the Australian context – through which State and Federal government agency representatives are invited to participate.

A key function of RBCC is to coordinate seven shared basin priorities including: fish passage; water quality; stream flow; basin-wide co-ordination; interagency cooperation and collaboration; outreach and education; and monitoring. The RBCC also provides a point of interface with federal government policy networks operating at the 'provincial level' for the North West Forest Plan, and State Government agency policy networks to implement the Oregon Plan for Salmon and Watersheds.

One challenge in implementing the restoration strategy lay in undertaking a river basin assessment that would support joint management efforts. While an extensive and detailed assessment could be prepared through contributions of different stakeholders, it may not be an *integrated* picture of river basin health allowing modelling of different management interventions in a holistic way. In this case the collaborative structures in place allowed a virtual 'technical pool' to be formed giving rise to a flexible 'technical team' at whole of basin scale drawing on skills and capabilities of the watershed

councils, state and federal agencies. The technical team approach provided a way to negotiate necessary changes in agency rules and practices around information management and reporting that would improve the management response. The RBCC also provided a connection between local stakeholders managing the actual restoration work and the broader basin technical assessment.

Through these processes local and expert knowledge was shared and connections between policy, science and management were tested and enhanced. Lastly collaboration of this kind provides stronger links between voluntary and regulatory actors around a common objective – river restoration. Some issues that need to be considered in such an approach include balancing sometimes competing desires for a technically efficient process and one that is inclusive of a wide range of participants in deliberations about river health<sup>54</sup>. Secondly decisions to integrate diverse sources of information can raise not only technical issues but issues about policy and agency procedures<sup>55</sup>. Thirdly as planning and management becomes more sophisticated at the local and regional levels, central governments may need to enhance their capacity to work and engage in these new arenas effectively.

#### **6.4 European Union's Water Framework Directive and public participation**

Analysis of what is required for effective stakeholder participation in water management has probably been undertaken most thoroughly in the context of the European Union's Water Framework Directive. The goal is that all major hydrological systems in the European Union should be of high ecological status by 2015. The unit for policy and management is the river basin and with its emphasis on the need to manage across both political and institutional boundaries it has many similarities with Australia's National Water Initiative's whole-of-hydrological system approach. Central to the Water Framework Directive is an emphasis on public participation and the role of civil society. In broad terms there are three ways to implement change, by force and negotiation under coercion at the direction of governments, through trade (the market) or through deliberation, education and collaboration. The Europeans are using all three but they place a very strong emphasis on the potential of the third element known under the catch all term 'social learning' or 'sustainability learning'.

The social learning approach of the European Union aims to create cooperative relationships and behaviour and new attitudes to the environment. In terms of the aims of its proponents it is not just about solving particular technical problems and achieving specific policy goals. The importance of public education about water and the environment is a major theme. People are encouraged to meet often in constructive circumstances in order to develop positive relationships which can then affect the way in which they work on water management problems together. Governments are encouraged to involve stakeholders early in the planning process and provide substantial support to their joint activities. The list of objectives is impressive (although there is no doubt that even in the best examples reality usually falls far short of the aim).

As part of the effort to promote public participation the European Union organised the HarmoniCOP project completed in 2008 to provide member countries with detailed guidelines backed by extensive research. The project produced a number of major reports. The Integration report states that four issues were central to the investigation:

- The need for structural change to water management institutions to create positive conditions for social learning;
- The importance of cultural factors shaping behaviour and the understanding of interactions between people, water and the larger environment;

- The central role of education and effective communications; and
- The need to see social learning as a key element of a wide range of processes involved in learning how to live and work sustainably.

The European Union program also stressed the importance of context and the need to build on established processes and existing networks 'rather than debunking them and trying to create alternative new ones'. Working within existing systems increases the potential to integrate the new with the old and increases the likelihood that the reforms will be accepted as legitimate. At the same time the need to document what is being done is also stressed so that different regions can learn from each others experiences. It is emphasised that social learning for river basin management should not be viewed in isolation rather it should be seen as part of a much wider social movement. At the same time the report warns that many of the constraints on social or sustainability learning are structural and deeply cultural and that change will need to be more profound than what can be achieved directly through governments using command and control methods.

Central to the HarmoniCOP project is detailed analysis of nine river basins in nine countries available on the project's website. They concluded with a list of recommendations and conclusions that are of general relevance in Europe and beyond, including northern Australia. First is an emphasis on the importance of context. Implementation in any particular place needs to be based on a detailed understanding of its specifics. It is necessary to have a wide understanding of options which can be gained from the literature and knowledge of efforts elsewhere, but this should be subsumed into plans that are highly sensitive to place. The importance of leaders and facilitators was another major theme. For a project to achieve success it is essential that it be built around key organisers who are highly motivated, technically competent and committed. The role of these people in building trust and alliances and negotiating conflicts between stakeholders was crucial. At the same time it should be accepted that there will be turnover in personnel. The answer to that risk however is not to build standard operational models designed to be useful in all circumstances but rather to promote capacity building in depth.

Working to reduce transaction costs and lengthy procedures was another imperative. Involvement fatigue is a particularly significant threat given the reliance on volunteers. Australian experience with community projects also supports this finding. Another finding is that it is very important to learn from crisis for future work. This requires a systematic approach to reflection and analysis as part of the adaptive management cycle. This is so obvious that it seems redundant to say it but in practice it is done all too rarely. Another obvious recommendation was the need for a well thought through understanding of the purpose of stakeholder involvement in each particular situation. Observing a generic requirement was not enough to make the process useful or effective. Related to this was the importance of understanding the great variety of backgrounds, knowledge and reasons why different groups are willing to take part. The need to engage key stakeholders such as large agencies which can bring in resources and wider perspectives was also stressed.

The research of the European Union into implementation issues is of particular interest because of the great variety of governance arrangements within which the Water Framework Directive is being applied. This element of the approach of the European Union is particularly interesting for Australia because the emphasis on culture change, education and public participation has been much less in this country. Compared with Europe water reform in Australia has been treated largely as a technical managerial exercise rather than a cultural project.

## 6.5 United States: Implementing agreed policies in the San Francisco Delta and Bay Area

Over the past one or two decades in the United States there has been a significant shift towards collaborative approaches to catchment or water shed management. This was the product of a number of factors – increased interest society-wide in alternative dispute resolution as an alternative to litigation, dissatisfaction with the implementation of the Federal 1972 Water Pollution Act particularly regarding non point source pollution and a growing concern that much environmental legislation was not democratically legitimate. The example of CALFED in California has already been referred to but its pre history is instructive. During the 1990s under the US Environmental Protection Agency's National Estuary Project a diverse group of stakeholders including developers, real estate agents, environmentalists and farmers worked cooperatively to develop a comprehensive conservation and management plan (CCMP) for the San Francisco Bay and Delta area. Amongst other factors competition for consumptive use of water and insufficient environmental flows had increased salinity levels degrading ecological and other values.

Over a five year period these groups debated, developed and adopted the CCMP that included a “set of agreed-on data on the state of the estuary and an indicator of salinity to use as a warning sign when biodiversity of the estuary was at risk due to insufficient freshwater releases.”<sup>56</sup> The governor of the state however did not follow the plan's recommendation and established, instead a different stakeholder advisory arrangement.

Despite disappointment of many participants, a culture of collective debate on water policy amongst government and non-government interests persisted. In ensuing years two things happened that are ascribed to the San Francisco Estuary Project (SFEP). One, the federal government adopted the salinity indicator and subsequently required the State to follow suit, resulting in the required environmental flows being released by the state. Two, the agreement seeking efforts by stakeholder representatives under the initial SFEP, along with the subsequent advisory team set up by the governor, “eventually resulted in the establishment of the CALFED Bay-Delta Program”. The CALFED program is a collaborative policy-making and water management process amongst the 23 state and federal agencies with responsibilities for managing water supply and protecting related natural resources in the Bay-Delta Area.

There are two important principles from this case. Firstly, government action can work hand-in-hand with multi-stakeholder planning efforts and is indeed often critical in ensuring implementation where cooperative agreements lack the ‘teeth’ to do so. Secondly supporting cooperation on water policy at one level can seed larger scale and more significant, longer-term cooperation down the track. In this sense it can be a wise investment in the long term management of river basins.

In the period immediately preceding the last couple of decades there had been a marked increase in litigation but with mixed results. Many legal decisions focused on procedural not substantive issues and efforts to avoid litigation were minimalist in their approach and with so many stakeholders thinking they could ‘win’ the litigious atmosphere discouraged the cooperation necessary to solve complex issues where the law was not clear which was often the case. In the more recent collaborative era the law still plays a role in that failure to agree will mean expensive protracted court proceedings with outcomes that are often hard to predict. Non point source pollution also did not lend itself to targeted legal action. In many situations a combination of education, commitments to change behaviour, and voluntary agreements to share costs and benefits along with publicity for those who do not cooperate, showed more promise in many situations.

Behind this change in approach was increasing support for collaboration from the federal Environmental Protection Agency. This included funding professional facilitators. The shift often brought together groups with very different beliefs and agendas. On the one side there was conservative discontent with federal agencies issuing edicts about federal lands. On another many

researchers were frustrated by the tendency of regulatory agencies to focus on the particular issue relevant to their organisation rather than taking a holistic approach to the many social and biophysical factors whose interactions were shaping environmental outcomes. There was also increasing interest in place-based management, many people wanted more control over their immediate environs and less direction from afar. Added to the mix was increasing assertiveness on the part of Native Americans backed by a number of major court decisions that gave them substantial rights to a range of environmental resources, such as fish, land and water.

These collaborative watershed institutions are marked by the use of watersheds or catchments as their organisational focus rather than political boundaries, the involvement of a wide range of stakeholders (some expert others not), reliance on face to face negotiations, commitment to finding compromises that benefit all parties and share costs equitably along with a fairly extensive exploratory phase where the wide range of stakeholders get to understand each others concerns and interests and develop a shared body of factual knowledge upon which to based future discussions.

Compared with past practice this collaborative approach has a number of novel features. To a significant degree all the stakeholders treat each other as equals even though there may be big differences in power and knowledge. Local knowledge is also given a higher status than has been usual in the past. The movement has its critics, however. Some environmental groups argue that major changes in say water allocations to production or other reforms that will significantly impact on stakeholder interests get scant consideration in consensus driven approach that tends to treat all interests as equally worthy.

## **7. THE DIFFICULTY IN IMPLEMENTING A SYSTEMS APPROACH: A MURRAY DARLING BASIN PERSPECTIVE**

A systems approach is necessary to link social, economic and environmental costs and benefits so they can be compared. Without a systems approach it is easy to ignore the social costs of policy or management failure that will be eventually be the responsibility of other organisations, other people or future generations.

The MDB is a large complex region. It is just over a million square kilometres in size, has a diverse range of landscapes, ecosystems, land uses and climates and includes over 30,000 wetlands, eleven of which are listed under the Ramsar Convention of Wetlands of International Importance. Managing the region is a difficult challenge. As is the case with many rivers that cross state or provincial borders within federal political systems, water policy and management in the MDB is characterised by considerable intergovernmental and interagency conflict, low decision making transparency and accountability, high transaction costs and ad hoc deals that undermine best practice water management. As with other large hydrological systems which cross political borders the MDB is highly exposed to the management challenges attached to common pool resources.

To counter the threats that face common pool resources subject to competing demands the National Water Initiative stresses the importance of a whole of hydrological systems approach to policy and management. Implementing a whole-of-systems approach that can take comprehensive account of the full range of issues that shape outcomes is, however, easier said than done. The NWC has invested heavily in programs to improve water planning but they have not been able to change the geographical boundaries or institutional divisions that continue to create a splintered planning environment rather a whole-of-system approach. Although few rivers in the north cross borders most of them are subject to the risks that are created by divided responsibilities between institutions.

## 7.1 Momentum of the past

The difficulties involved in reforming a system that has been allowed to expand under the momentum of self-selected development interests is well illustrated by considering the debate about implementing the NWI's requirement that plans should only allow 'environmentally sustainable levels of extraction'. The NWI outlines a process that requires developing a detailed description of the system that should be protected by the relevant water plan including key environmental assets and processes and means of assessing the degree to which this is being achieved. What is envisaged is an iterative process in which society decides how much of river's non-provisioning, often non-marketed services it is willing to sacrifice for a given set of provisioning outcomes (usually as marketed food or fibre). The result is still meant to be a river system that can be described as an ecological system, albeit modified, and protected as such.

This conflicts with the reality that exists for many systems that have over assigned water entitlements to competing interests. They are the unplanned result of more than a century of development. They are often little more than water distribution networks rather than stable ecological systems. The NWI points to a future where they would be held stable rather than continuing in ongoing decline and allowed to develop new environmental patterns in response to the new conditions. When the aspirational elements contained in the forewords and introductions of most water plans are stripped away, however, it can be seen that their operational core is shaped by debate about what is the acceptable level of sacrifice given the strengths of the key stakeholder groups involved. They are influenced by consideration of key environmental goals and key ecological functions but the need to protect them is not their starting point.

The major policy documents do show awareness of this reality but largely assume that all governments and stakeholders will work to reconcile these two very different positions. The history of water policy since the reforms of the 1980s has many examples that show reluctance to move beyond in-principle commitments to reconcile the two positions. Despite widespread expectations to the contrary, extractions continued to grow after the Salinity and Drainage Strategy was introduced in 1989 because New South Wales in particular exploited the hidden potential of its sleeper and dozer licences. The Cap on extractions introduced in the mid 1990s<sup>62</sup> never moved beyond its initial stage of implementation even though the commitment and need to do so was detailed in the original agreements and in the annual reports of the Independent Audit Group<sup>63,64</sup>. Similarly the 2004 program to protect six icon sites was named – rather forlornly – The Living Murray First Step Decision but there has been great delay in implementing it and no suggestion as to what might constitute the second step.

Looking at the current situation it could be argued that the Murray Darling Basin Plan is the second step (although it has not been designated as such). Whatever its title, however, it is likely to face a hostile reception if the draft to be released in 2010 suggests changes to the balance between irrigation, the environment, Indigenous interests, urban water users out of the MDB such as the population of Melbourne and ecological features such as the lower lakes and Coorong. The point of this discussion is not to encourage cynicism or despair but rather to emphasise the importance of making major strategic decisions as soon as possible before strong stakeholder groups, with a reliance on the continuation of unsustainable water management practices, become consolidated.

## 7.2 Markets

In southern Australia markets are a major force for change and increased economic productivity. In the near future their role in the north is likely to be less significant. However, in accord with the

principles that should be used to design adaptive management systems, we need to design institutions in the north with that potential in mind. Markets have a lot to recommend them as the drivers of change. They:

- are part of a wider trend to use markets and commercial processes in as many aspects of life as possible (neo-liberalism)
- make it possible to use competition as a process to find lowest cost solutions, stimulate innovation, reduce the retention of unused capacity
- allow people to exercise discretion regarding their time and so are seen as highly compatible with greater freedom of choice
- are seen as a good guide for future investment as an alternative to fads or policy inertia
- provide a tight link between costs and benefits and are one way to deal with the problem of how do you get beneficiaries to pay for the things that give them benefits
- put some distance between governments and unpopular policy objectives which can be achieved through market processes
- make it possible to achieve environmental objectives such as shifting the balance between production and environment by paying the market price (but no more).

Markets have played a major role in the transformation of the MDB over the past decade but it is not clear whether they can play a similar role in the north. Even in the MDB the role of water markets has been a mixed story. In 1994 the Council of Australian Governments approved a new rural water reform package<sup>65</sup> which was the precursor to the NWI<sup>62</sup> ten years later. Hydrological systems were to be made sustainable, financially self supporting and economically more productive. Markets were seen as the source of energy that would drive water reform. The vision was that a more robust approach to pricing policy would see all or most of the costs of water management (including, somehow, the cost of dealing with environmental degradation) included in the price.

Then the market would move water away from zones of high impact where environmental regulation limited its uses to areas where it can operate with less restriction to support higher value activities whether they be different types of irrigation, mining or urban centres. This would reduce environmental damage from water logging and rising saline groundwater tables – a major policy concern in the 1990s – and increase the financial returns to society as a whole from water-based activities.

There have been some triumphs. It has been calculated that the economic impact of the drought has been halved through the way in which markets have allowed water to be moved around the basin. From a broader perspective, however, the picture is more complicated. First it has been difficult to include many important costs in the water price. Second is the problem of stranded assets and of the economic impact on people who were dependent in different ways on the economic activity based on irrigation but who were not able to benefit from the sale of water entitlements. (Good statistics are hard to come by in this area and much of what is said is hard to prove)

A key point is that support for markets is highly selective. People often approve of their use in some situations and not others. Irrigators who support the sale of water to other irrigators for example often do not support its sale to urban centres even though the price is much higher. If the original vision of the reformers responsible for the COAG 1994 rural water reform program<sup>65</sup> had been vindicated there would have been no reason to try and sweeten beyond the market price the transfer of a relatively small amount of water from the southern MDB in central Victoria to Melbourne to substantially improve that city's water security. In an effort to get it approved the

Victorian and Commonwealth governments have made commitments to upgrade infrastructure that could cost up to two billion dollars – many time more than the likely cost of the water on the water market. Similarly the South Australian government could probably have purchased sufficient water to save the lower lakes. In the latter case objections from the up river states have shown that still they do not see water as an economic good to be trade back and forth like many other items. For many people in southern Victoria opposing the sale and transfer to Melbourne, and for the two upper states in the Murray Basin blocking the purchase of water for South Australia, the value of water is clearly not reflected in its price.

These disputes highlight the complex web of cultural attitudes that surround water and which should be taken into account by policy makers planning for the north. One issue that should be noted is that water issues can quickly become political. Contrary to any notion that the market might be the main source of energy to reshape water management in Australia a number of groups have shown in recent years that water reform can be influenced directly through the political process. This reflects the great expansion in the types of groups that are now accepted as legitimate participants in debates about water policy. Traditional stakeholders such as irrigators who possess water entitlements now have to compete for influence with many who do not. Environmental and Indigenous groups, for example, are now very significant. At this stage there is great frustration in their ranks caused by the difficulty in finding ways of achieving their goals but they have certainly acquired substantial power to be able to block activities of which they disapprove.

### **7.3 Public participation, justice and equity**

A challenge for any water reform program is gaining acceptance and enthusiastic support from the people affected by its implementation. Without that support in a democracy there are many avenues that can be used by critics to block implementation. A good example of the dynamics involved was the attempted reduction in groundwater allocations under the Gwydir groundwater plan in New South Wales in the earlier years of this decade. The initial plan imposed the same percentage cut on all entitlement holders. But strong protest eventually forced the state government to give a significant weighting to favour those who had also invested in the development of their irrigation systems. The importance of gaining community acceptance is particularly significant with groundwater – which in many parts of northern Australia is the primary potential source of irrigation – because it is not supplied from a central point that allows the distribution of water to be easily administered and monitored. The decentralised nature of groundwater extraction means that compliance is much harder to monitor so the need for community support is proportionally greater.

This places a strong emphasis on the importance of process in water planning implementation. If the process is not accepted as just by most people it will be difficult to implement in a democratic society. In the areas affected the issues involved need to be widely discussed as early as possible. The science needs to be well understood and robust. The full range of mitigation options needs to be identified and if any particular group is to suffer disproportionately in a way that they and others will regard as unfair then the need to provide compensation should be considered by the governments involved. Further, if there is to be compensation it is better done early rather than late. Once passions are aroused and bargaining positions consolidated demands for compensation will increase in size.

The quality of the consultation process is key. There are many options and they need to be tailored to the particular circumstances applying in a given time and place. Different approaches suit different aims. Stakeholder committees are not a substitute for detailed negotiation with key interest groups or general community education. The role of any consultation process should also be clear. Given their composition and relationship with their various constituencies such committees should not

have decision making roles. But how will governments use their advice? All these issues need to be thought through as early as possible. Options include established processes of peer review by independent experts, stakeholder panels, avenues that allow appeals against decisions and arrangements that allow submissions from the public and stakeholder groups. Alongside this is the importance of effective communications. There is a large body of literature both within Australia and internationally that discusses these issues and it should be analysed in detail.

## **8. DESIGN PRINCIPLES**

1. Clear foundational rules and objectives of water institutions that are established early, and a system to measure progress towards objectives. Thresholds of Potential Concern (TPCs) that are developed within an objectives hierarchy can serve as 'amber lights' and warn of a possible change that may not allow objectives to be reached.
2. Investment in cooperative and deliberative processes, even at local levels to seed larger-scale and more significant, longer-term cooperation down the track to underpin river basin management;
3. Effort to avoid further fragmentation of management responsibilities and functions across boundaries or between managing agencies. The focus needs to be on organisational cooperation.
4. An integrated mix of policy instruments: sanctions, markets and engagement tailored to local settings. Markets should not be relied on to distribute social and ecological benefits.
5. Rules and policy instruments enacted within an explicit adaptive management-social learning framework to assist with managing uncertainty;
6. Decision-making that is inclusive of all interests and which reflects the meaningful participation of diverse groups in water resource planning and promotes deliberation on development alternatives.
7. Where social institutions (e.g. local agreements, rules or customs) exist that sustains healthy water resource condition formal institutions (e.g. regulation or penalties) should enhance and not override them.
8. As planning and management becomes more sophisticated at the local and regional levels, central governments may need to enhance their capacity to work and engage in these new arenas effectively.
9. To enable adaptive management, major transformation processes may be needed when the structural requirements for adaptive management, such as adaptive institutions and a flexible technical infrastructure, are lacking.

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