Principles for the Nested Governance of Water Resources

Ian Reeve

Institute for Rural Futures Occasional Paper 2003/1

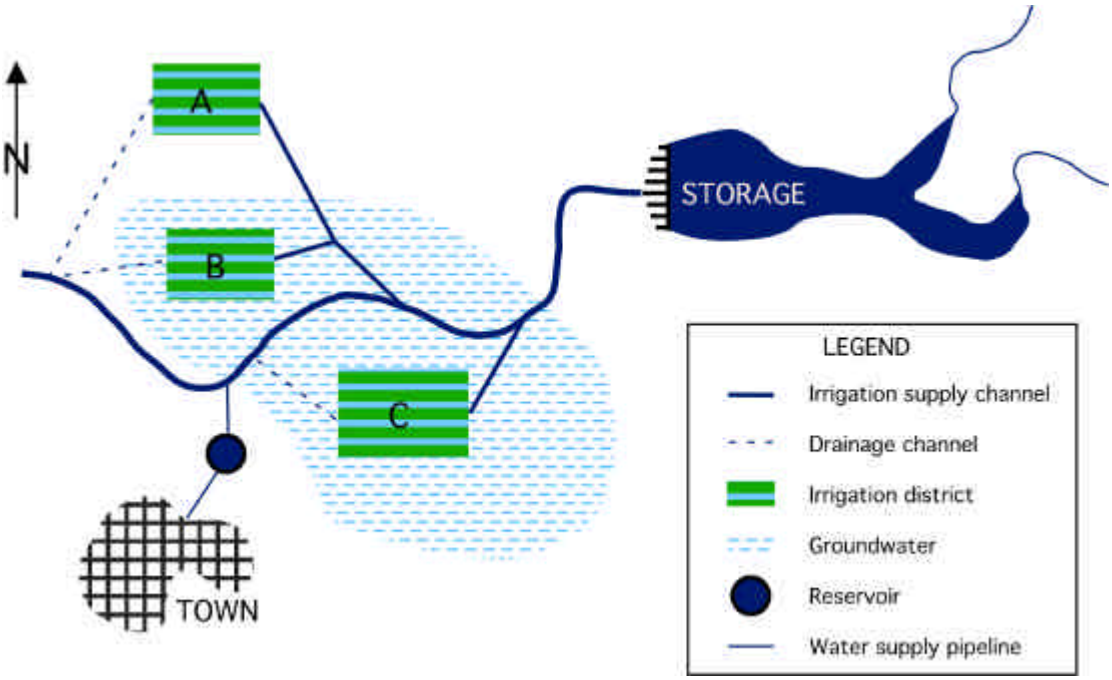
1 Introduction

The following summary of principles for the effective and sustainable management of water resources through nested governance is drawn from the work of McKean (2001), Reeve, Marshall and Musgrave (2002) and Ostrom (1989). These publications are themselves reviews of international and Australian experience in the management of water resources.

2 Nature of the Resource to Be Managed

The water resources and ecosystems of the Murray Darling Basin are complex and interdependent. The actions of one water user can affect many other water users. Any one water user is affected by the actions of many other water users, and by land use and economic development in the Basin more generally. To envisage how water resources might be managed, consider the catchment illustrated in Figure 1. It shows a water storage, three irrigation areas and a town. Two of the irrigation areas are underlain by a groundwater resource. Each of the irrigation areas comprises a small number of irrigators (say less than 10). The intake for the town water supply is downstream of the drainage outfall for irrigation area C.

Figure 1 Simplified catchment, irrigation areas and a town water supply.



The interdependencies between water users are as follows:

- the town and the three irrigation areas share surface water from the storage,
- the town and irrigation area C have an interest in the water quality in the reach of the river between the supply intake of the former and the drainage outfall of the latter (Middle Reach), and
- irrigation areas B and C share groundwater for pumped irrigation.

3 Nature of the Institutions for Management

Institutions are the rules, procedures and norms which water and land users follow to ensure that the actions of individual users do not unduly disadvantage others. Effective institutions:

- minimise the costs of managing the resource,
- conform with the social and political values of those affected by them,
- engender commitment to abide by collective decisions taken using these institutions,
- ensure that quality and quantity of the resource is maintained for future users, and
- provide a stable environment in which private investment and economic development can take place.

Institutions can vary enormously in their degree of formality. For example, a group of five irrigators sharing a delivery channel will generally only require occasional meetings, phone calls and chance encounters in town to share maintenance tasks and coordinate their extraction of water from the channel. Social interaction, shared cultural background, and awareness of a shared fate engenders commitment to the rules decided upon for the use and maintenance of the resource.

On the other hand, a group of several thousand water and land users spread over thousands of square kilometres requires formal institutions by which their interests can be articulated and represented in decision-making forums. These may include government legislation, government regulatory agencies, establishment of formal decision-making bodies, testing of rights and responsibilities in courts of law, incorporated interest groups, elections of representatives and formal meeting procedures. The commitment of water and land users to these institutions depends on a wide range of factors including:

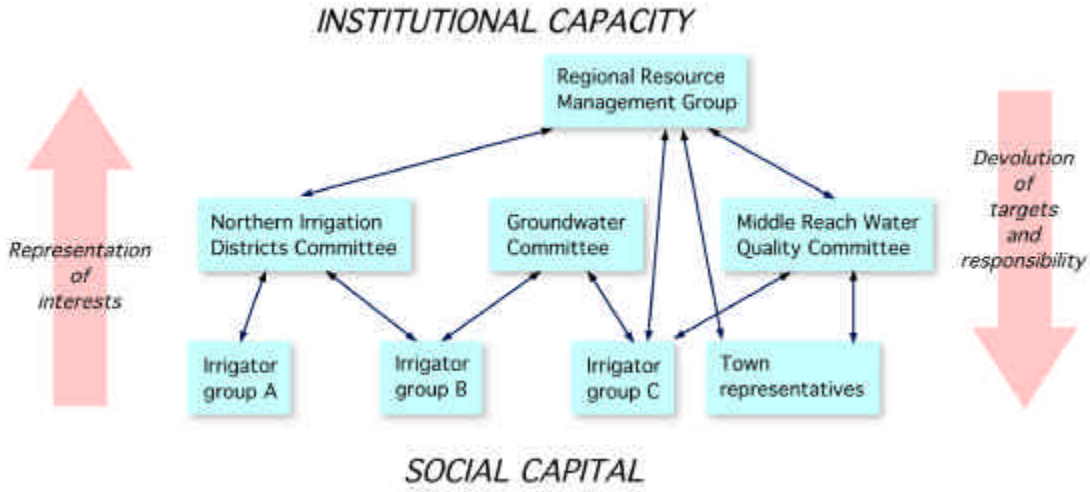
- past history of commitment and relationships with government,
- perceived legitimacy of the institutions,
- perceived procedural fairness of the institutions,
- perceptions of the costs and benefits of cooperation versus disobedience,
- local social cultures (e.g. individualism, civil disobedience and lawlessness), and
- competence of government agencies.

4 Institutional Design — Matching the Institutions to the Resources

From international and Australian experience in the management of water resources it is generally agreed that it is possible to design a mix of informal and formal institutions that will achieve the goals mentioned above, viz. institutions that minimise costs, are culturally appropriate, engender commitment, ensure sustainable uses of resources and provide a stable base for economic development.

Figure 2 summarises an institutional design for the management of the water resources and interdependencies between users illustrated in Figure 1.

Figure 2 Summary of institutional design for managing the water resources in Figure 1.



4.1 Irrigator groups

Irrigator groups A, B and C comprise all the irrigators in each of irrigation areas A, B and C. These groups manage the infrastructure and coordinate extraction from their shared channel, but do not determine the share of the storage available to them. Because they comprise a small number of members, less formal institutions are possible because of their relatively frequent social interactions. Alternatively, irrigator groups may wish to establish more formal arrangements that involves rules about use of the resource, monitoring of compliance with the rules and agreed sanctions against those found breaking the rules. Principles to ensure the efficient operation of the groups and sustainable use of the resource include:

- groups should each be small, have a shared cultural background and past experience of working together (social capital),
- groups should each be homogeneous with respect to individual's interests in the resource, but heterogeneous with respect to skills and personalities,
- groups should have access to low cost means of resolving internal conflicts,
- any rules used by a group should be of its own design, easily understood and easy to enforce,
- the rules need to allow for monitoring of compliance and a set of graduated sanctions for non-compliance (i.e. the more serious the offence, the more severe the punishment),
- if the rules involve office holders, these must have a clearly defined role and method of being chosen and be accountable to resource users, and
- the costs of group operation and management of the resource should be a small fraction of the benefits derived from the use of the resource.

4.2 District committees

For irrigators in areas A and B, there are additional decisions to be made about the maintenance of the channel that both areas use, and about their coordination of extraction from the shared channel. These decisions are made by the Northern Irrigation Districts

Committee (the choice of 'committee' is arbitrary — this group could be a board or a council etc.). The Committee comprises representatives from irrigator groups A and B. The interests of the two irrigation areas are brought to this higher level decision-making forum by their representatives, and decisions made in this forum should be binding upon irrigator groups A and B. These decisions should focus upon the goals of resource management such as targets and standards. How these decisions (e.g. specified targets) are implemented within the irrigation areas is up to the members of each group. For example, if the Northern Irrigation Districts Committee decides that area A will bear 60 per cent of the maintenance costs of the shared channel, then it is up to irrigator group A to decide how these costs will be apportioned among its members. Irrigator group B also has representatives on the Groundwater Committee, along with those from irrigator group C. Once again, the interests of the two irrigation areas in the groundwater resource are represented in the higher level forum by their representatives, the decisions made there are binding on the two irrigator groups, and the groups have control over how the decisions will be given effect. The same applies to the Middle Reach Water Quality Committee. As for the irrigator groups, the effective operation of the district committees depends upon principles such as:

- committees should have access to low cost means of resolving internal conflicts,
- any rules used by a committee should be of its own design, easily understood and easy to enforce,
- the rules need to allow for monitoring of compliance and a set of graduated sanctions for non-compliance (i.e. the more serious the offence, the more severe the punishment),
- if the rules involve office holders, these must have a clearly defined role and method of being chosen and be accountable to the organisations represented on the committee, and
- representatives on the committees need to communicate effectively with their constituencies, both in informing about the deliberations of their committee and in responding to and articulating the concerns of their constituency.

4.3 The Regional Resource Management Group

Once again, the use of the term 'group' is arbitrary — council, authority, board, association etc is equally applicable. In this example, the Regional Resource Management Group is primarily concerned with the allocation of shares of the storage to consumptive uses and to the environment. It comprises representatives of groups or committees who have an interest in the use of this water resource. Because the water quality in Middle Reach is affected by the water available for environmental flows, the Middle Reach Water Quality Committee is represented. The Groundwater Committee is not represented because, in this example, it is assumed that there is no hydrological connection between surface flows and groundwater recharge or discharge. If there was a connection, then the Groundwater Committee has an interest in the allocation of shares of the storage and is represented in the Regional Resource Management Group. As for the Committees, the interests of the constituent organisations are represented in the decision-making forum, the decisions are binding upon these organisations and the organisations have the freedom to choose how the decisions will be implemented.

4.4 Principles for nested hierarchies

The arrangements summarised in Figure 2 are an example of a nested hierarchy of resource management groups. Such hierarchies can be readily extended to accommodate the pattern of interests and interdependencies among resource users. For example, the town representatives shown in Figure 2 might be drawn from a ratepayers' association and engineers from local government. The Regional Resource Management Group might include representatives of

estuarine fisheries further downstream who have an interest in the pattern of freshwater flows through the river estuary.

The upper levels of nested hierarchies frequently have representatives of government interests. Government interests are generally more varied than the direct interests of resource users. For example, the river shown in Figure 1 might pass through wetlands further downstream which have been protected through an international convention, the national government being a signatory to this convention. In this case, global interests are being brought to the decision-making forum by government representatives.

Governments also have an interest in the orderly use of resources with a minimum of social conflict. Accordingly, governments may be represented in decision-making forums to ensure that decisions and rules devised in these forums make use of existing institutions. For example, existing civil law may be used to impose sanctions for non-compliance. Governments may be represented so that they can make assessments of the need for external support and structural adjustment assistance that flows from the decisions taken by groups in the hierarchy.

The efficient operation of nested hierarchies, and the sustainable use of resource can be achieved through a number of principles.

- The arrangement of the hierarchy must reflect the pattern of interests in the resource and interdependencies among users.
- Levels of social capital need to be equally well developed in all groups with an interest in the resource, so that all groups have an equal opportunity to represent their interests. Marginalised groups who may have difficulty in organising representation and articulating their interests may need support and this support should be culturally appropriate where necessary.
- Interests are defined both by consumption of the resource and the creation of external effects on others through the use of the resource.
- Groups at all levels should have a small number of members. If numbers become large as more interests are discovered, use the pattern of interests to devise sub-groups.
- Strong social capital is required in the lower layers of the hierarchy to provide the mechanisms that make small groups successful in managing resources.
- Strong institutional capacity is required in the upper layers to provide effective processes of political representation, decision-making, judicial review and the clear expression of targets and guidelines decided upon.
- Resource allocation issues requiring decisions are passed upwards through the hierarchy until they reach the forum where all those with an interest in the decision are represented. Similarly, the design of policy instruments for water allocation, such as water trading, is passed upwards through the hierarchy to that point where all those affected by the operation of the instrument are represented.
- Decisions, and associated targets, goals etc., are passed downwards through the hierarchy and are binding on the groups to which they are passed.
- Timing of the upward flow of issues and the downward flow of decisions and associated targets is critical. Before they commence any implementation planning, groups at the lower levels must have access to clearly defined targets and guidelines that have been decided upon by the representatives in the upper levels. Similarly, before any decisions are taken in the upper levels, it must be certain that all relevant interests have been articulated and represented at these levels.

- Short-cutting of the upward flow of representation and issues and the downward flow of targets and standards is not permitted, as it undermines the legitimacy of the resource management arrangements and the commitment of stakeholders to these arrangements. There are two ways in which interest groups attempt to short-cut the operation of a nested resource management hierarchy for their own ends. Firstly, and at the local level, local interest groups attempt to bring national or international level considerations into the decision-making (e.g.. when representatives of environmental interests raise international concerns such as the greenhouse effect to attempt to influence local decisions). Secondly, local interest groups may attempt to close out the legitimate concerns of other interests at higher levels in the hierarchy by lobbying the decision makers at those levels (e.g. when small groups of irrigators lobby government ministers for decisions that favour their interests). Legislative micro-management and unduly prescriptive ministerial direction are additional ways in which the downward flow of targets and standards may be by-passed
- All groups have the freedom to choose the manner in which the decisions will be implemented, provided the chosen approaches do not impact on others outside the constituency of the group. For example, irrigators in irrigation area A might decide to sell their water entitlements to irrigators in irrigation area C. However, this decision would impact on the irrigators in irrigation area B, who would then have to carry the full cost of the maintenance of the previously shared supply channel. Consequently, the decision whether to trade entitlements out of irrigation area A, and conditions on those trades should be made by the Northern Irrigation Districts Committee. If the trading of water into irrigation area C affected the drainage outfall from that area, and consequently water quality at the town water supply offtake, then decisions about trading of entitlements need to be taken higher in the hierarchy, i.e. by the Regional Resource Management Group.
- Where governments are represented in the nested hierarchy, it is essential that their role is clearly specified and understood. The upper levels of nested hierarchies will generally need to interface with existing government institutions, such as Catchment Management Authorities and water supply authorities (Victoria) or Catchment Management Boards (New South Wales).

5 Do Nested Resource Management Hierarchies Work?

The principle listed above have been distilled from a number irrigation systems around the world that have a long history of orderly and sustainable use of water resources. There are also a small number of examples from Australia where water resource planning has proceeded relatively smoothly, due in part to fortuitous adoption of some of the principles outlined above. For example, the preparation and implementation of Land and Water Management Plans in the Central Murray irrigation districts in the 1990s took place through a system of distributed governance that has received favourable assessments in a number of studies (Marshall, 2002; Musgrave, 1996).

On the other hand, many of the problems that are being encountered in the water reform process in New South Wales have their origins in the violation of the principles listed above. For example, there was widespread community dissatisfaction with the process for developing water sharing plans because the State Water Management Outcomes Plan was not available until many Water Management Committees were well advanced in developing their water sharing plans (National Competition Council, 2002, 2003). In other words, there was a failure to provide the lower levels of the water resource governance hierarchy with clearly defined targets and guidelines.

6 References

Marshall, G. R. 2001. *Crafting Cooperation in the Commons: An Economic Analysis of Prospects for Collaborative Environmental Governance.* Ph.D. thesis, School of Economics, University of New England, Armidale.

National Competition Council 2002. *Assessment of Governments' Progress in Implementing the National Competition Policy and Related Reforms. Volume 2: Water Reform.* National Competition Council, Canberra.

National Competition Council 2003. *Water Reform in New South Wales. National Competition Policy Supplementary 2002 Water Reform Assessment.* National Competition Council, Canberra.

McKean, M. 2001. Nesting institutions for complex common-pool resource systems. In: Graham, J., Reeve, I. and Brunckhorst, D. (eds) *Landscape Futures: Social and Institutional Dimensions.* Proceedings of the 2nd International Conference on Landscape Futures, 4-6 December, 2001, Armidale. Institute for Rural Futures, University of New England, Armidale.

Musgrave, W. F. 1996a. The irrigation industry in the Murray-Darling Basin and aspects of its reform. In: Pigram, J.J. (ed.) *Security and sustainability in a mature water economy: A global perspective.* Centre for Water Policy Research, University of New England, Armidale. 43-62.

Ostrom, E. 1990. *Governing the Commons.* Cambridge University Press, New York.

Reeve, I., Marshall, G. and Musgrave, W. 2002. *Issues Paper No 2: Resource Governance and Integrated Catchment Management* Report to Murray-Darling Basin Commission. Institute for Rural Futures, University of New England, Armidale.