TOWARDS DESIGN PRINCIPLES FOR NESTING IN AUSTRALIAN WATERSHED MANAGEMENT[*]

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Abstract:

Despite the complexity of watershed management, policy-makers in Australia and other countries have given little systematic attention to the challenge of learning how to organise it effectively. Meanwhile, evidence has emerged that community-based organisational systems with enduring success in addressing complex problems of natural resource management are likely to consist of 'multiple layers of nested enterprises'. This paper considers the contribution that organisational nesting of this kind could make to improving the performance of watershed management programs, particularly in Australia. After reviewing the theoretical advantages of the organisational nesting concept for complex problems, the focus of the paper shifts to identifying on the basis of a literature review a set of preliminary design principles that, after an appropriate process of 'ground-truthing' and refinement, might be used to guide application of the concept to watershed management, at least in Australia. The set identified contains 24 preliminary design principles. This includes 10 structure-related principles organised under four headings (i.e., base-level units, boundaries, rules, and subsidiarity) and 14 process-related principles organised under 12 headings (i.e., catalysing voluntary cooperation, formalising organisational processes, pacing organisational growth, purposefulness, recruiting leadership, learning, participation in decision-making, monitoring and enforcement, conflict resolution, government recognition, deliberative decision-making, and leading by example). The value of this set for actual watershed management programs in Australia is to be explored over the next few years through case studies of three such programs.

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1. INTRODUCTION

Under the banner of 'integrated catchment[1] management', the watershed approach to natural resource management (NRM) was adopted by Australian governments during the 1980s. This approach recognises the interdependence of NRM problems and the consequent need to solve them in an integrated and collaborative way, including by integrating bottom-up and top-down decision-making processes into 'community-based' processes.

Despite the widespread support for this approach originally, Bellamy, McDonald et al. (1999 p.351) found that applying it successfully in Australia 'is proving to be a considerable challenge'. It has been rare for plans developed under the approach to be successfully implemented (Bellamy and Johnson 2000; Margerum 1999), and frustrations have surfaced as a result. For instance, the (Australian) House of Representatives Standing Committee on the Environment and Heritage (HRSCEH) (2000 pp.1, 3) remarked '[i]t is not overstating the matter to say that the ecologically sustainable use of Australia's catchment systems is the most pressing public policy issue facing the community. … Australians want the talking to stop and the action to begin'.

Such frustrations are not limited to Australia (e.g., Born and Genskow 2001; Margerum 1999; Rhoades 2000). The watershed approach to NRM has been adopted throughout the world (Kerr and Chung 2001). Reviews of watershed management programs frequently comment on the lack of systematic attention given to learning how to improve their performance. For instance, Rhoades (2000 p.333) remarked that the social knowledge underpinning the design of watershed management programs 'is almost entirely anecdotal'. The HRSCEH (2000 p.5) found similarly that 'the current approach to, and application of catchment and natural resource management in Australia is ad hoc, inconsistent and confusing'.

This is not to deny that learning from experiences in watershed management is a complex undertaking. Born and Genskow (2001 p.11) observed accordingly from the US watershed management experience that:

> An enormous array of factors can influence the success of watershed partnerships. [Numerous investigators] have conducted research on partnerships in attempts to discern and clarify the relationships between characteristics, actions, and outcomes. …

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[1] 'Catchment' is the term used commonly in Australia for 'watershed'.

Researchers and practitioners have applied numerous analytical approaches to this problem … and have lumped, split, and re-divided their lists of critical factors myriad ways. The reality remains that the watershed community does not fully understand which factors are critical in various circumstances or how factors interact to influence accomplishments.

This paper has been prepared in the early stages of a project that seeks to address this undertaking more successfully, at least in Australia. The project was motivated by Ostrom's (1990 p.101) finding that all the community-based NRM programs she studied that had succeeded in solving large-group and otherwise complex problems of collective action in an enduring way had been 'organized in multiple layers of nested enterprises'. She referred to this common finding as a 'design principle', by which she meant 'an essential element or condition' helping to explain the success of programs in sustaining the natural resources within their jurisdictions and gaining continued compliance with the rules they have set (ibid. p.90). She illustrated the concept of nested enterprises with a number of examples including the one following:

There are two distinct levels in the Philippine federation of irrigation systems. The problems facing irrigators at the level of a tertiary canal are different from the problems facing a larger group sharing a secondary canal. Those, in turn, are different from the problems involved in the management of the main diversion works that affect the entire system. Establishing rules at one level, without rules at the other levels, will produce an incomplete system that may not endure over the long run (ibid. p.102).

The potential value of this design principle for assisting learning about how to organise Australian watershed management programs more effectively has been noted in a number of recent studies (Bellamy, et al. 2002; Marshall 2001; McKean 2002; Musgrave 2002; Reeve 2003; Reeve, et al. 2002). However, applicability of this design principle to Australian watershed management programs needs to be explored further before recommending its widespread adoption. For instance, the cases studied by Ostrom (1990) in the process of identifying this principle (e.g., forests, irrigation systems, groundwater systems, and inshore fisheries) were all small in scale and narrow in scope compared with the large-scale and multi-resource problems addressed typically in Australian watershed management programs. This applicability will be tested in the remainder of this project, through case studies of three watershed management programs.

The purpose of this paper is to outline the theory behind the design principle and, on the basis of this theory and a review of existing literature pertinent to this design principle, identify a preliminary set of guidelines by which it might be translated into the design of actual watershed management programs in Australia. These guidelines might be regarded as second-order design principles. The applicability of this preliminary set of second-order principles - referred to hereafter as 'design principles for organisational nesting in watershed management' - to actual watershed management programs in Australia will also be tested through the project's three case studies. The remainder of the paper is organised as follows. The theoretical advantages of organisational nesting for complex problems of collective action are discussed in Section 2, after which a preliminary set of design principles for organisational nesting in Australian watershed management is proposed in Section 3. Concluding comments are presented in Section 4.

2.   ADVANTAGES OF ORGANISATIONAL NESTING FOR LARGE-GROUP AND OTHERWISE COMPLEX PROBLEMS OF COLLECTIVE ACTION

2.1   Advantages for solving the free-rider problem

Olson (1965) first recognised the 'free-rider problem' as an obstacle to individuals with a common interest in a collective good acting voluntarily to provide themselves with that good. Collective goods are goods that require joint provision (because individuals cannot provide them alone) and whose benefits are not exclusive to those who contributed to the provision effort. Prospective contributors to a collective good might as well save themselves the effort, therefore, and 'free ride' on the benefits available to non-contributors. It follows that everyone will seek to free ride, and zero provision of the collective good will occur. Most collective goods of relevance for natural resource management are of the kind called common-pool resources (CPRs). In addition to the non-exclusivity shared by all collective goods, goods of this kind are depletable.

The HRSCEH (2000 p.69) highlighted as follows the relevance of the free-rider problem for watershed management in Australia:

> Even when a number of residents do implement catchment management, other residents
> may not be motivated to participate. As a result, residents who do not participate will be in
> a position to obtain the benefits of participation without any of the associated burdens,
> effectively 'free riding' on the efforts of others. Two results generally flow from this. First,
> even if those who do choose to participate remain within a program, the overall
> effectiveness of the program will be diminished more than would be the case if all

residents participated. Second, over time, the number of participants will diminish when those who are shouldering the burdens of participation realise that their efforts are being diminished by the 'free-riders' and that, in effect, they are supporting the environmentally irresponsible practices of the free-riders.

Olson (1965) concluded only that zero voluntary provision is inevitable for collective goods sought by 'large groups' that are unable to organise themselves as 'federal groups'. He regarded a group as large when it reaches the size that 'each member … is so small in relation to the total that his actions will not matter much one way or another' (ibid. p.62), thus making it irrational for individual members to incur the costs of punishing one another's free riding.

If a large group could reorganise itself as a federation of small groups, however, this logic against group members imposing social punishments for free riding ceases to apply. Nevertheless, organising a federation is itself a collective good. An important advance in understanding how large groups sometimes provide themselves voluntarily with federal structures and other collective goods occurred when this provision problem was reframed as an assurance problem (Runge 1981). Under this framing, each group member is predicted to reciprocate what he or she trusts other members to do, whether this is cooperating with provision efforts or free riding. The more that individual members trust other members will cooperate, therefore, the more they are predicted to cooperate.

This shifts the focus of explaining how large groups provide themselves with collective goods to the problem of how they establish mutual trust. Ostrom (1998) proposed that trust, reciprocity and cooperation are mutually reinforcing, and so advance or retreat together depending on whether circumstances are conducive to building or eroding trust, respectively. If voluntary cooperation can gain a foothold in at least one small group encompassed by a large group, therefore, it might with supportive conditions advance eventually to the scale of a large group.

Nevertheless, the success of a large group federating by building on self-governing capacities existing in small groups of its members will depend crucially on its ability to gain voluntary cooperation from those small groups. Establishing a federation creates new, 'vertical' assurance problems between this 'hierarchy' and each of these small groups. Hence, these small groups will cooperate voluntarily with the federation only to the extent that they trust it to *cooperate with them* in helping their large group provide itself with the collective good/s it seeks. The more that this trust is lacking, therefore, the greater will be the need for the federation to incur the significant

costs of coercing cooperation; the less consequently will the large group benefit from its existence.

This reasoning exposes a key weakness in the conventional, 'Progressive' approach to solving large-group problems of collective action. In this approach, only the state is trusted to solve these problems rationally. Problems are defined, and solutions planned and implemented, centrally by the state, regardless of the desires and capacities of the smaller units of civil society to participate in this effort. Citizen trust in the state cooperating with them to solve their problems has thereby become considerably depleted.

The foregoing discussion yields one perspective on the advantages of nested organisational systems, compared with centralised systems, for addressing large-group problems of collective action. I have enunciated this perspective previously as follows:

> For policy analysts to presume that government alone should establish and maintain the organisational capacity required to provide the institutions needed to solve all … large-group collective-action problems is … to squander the significant 'order for free' that could be harnessed potentially if government were expected instead to facilitate the accretion of hierarchical organisation from the bottom up. In this alternative conception, government would be seen not as a Leviathan but rather as merely the highest level of a multi-layered, or polycentric, system in which governance units at any level 'nest' rather than supplant the capacities of lower-level units (Marshall 2001 p.205).

2.2 Advantages for adaptive management

According to advocates of adaptive management, the superiority of this policy paradigm over the Progressive paradigm arises in policy problems involving 'complex adaptive systems'. The elements of such systems 'adapt to the world – the aggregate pattern – they co-create. … As the elements react, the aggregate changes; as the aggregate changes, elements react anew' (Arthur 1999 p.107). The positive-feedback dynamics driving this co-evolutionary process reinforce small random events met anywhere in the system. Small events can thus flip a system onto one of many possible paths. The timing of such a flip and its effect on the subsequent path taken are rarely predictable (Berkes 2002). The Progressive paradigm, on the other hand, presumes that all policy problems involve mechanistic, predictable systems.

Justifications for adaptive management proceed on the basis that human cognitive capacities are incapable of optimally solving problems concerned with complex adaptive systems, even if

armed with complete information, i.e., that our rationality is 'bounded' when faced with such problems. We therefore 'satisfice' when faced with problems of this complexity, choosing the best solution from a limited range of possibilities explored.

Due to the need to satisfice in complex policy choices, identifying at the outset the option that efficiently realises policy goals is unlikely. Given the positive feedbacks generated by any choice affecting a complex adaptive system, any such choice is irreversible in the sense that reverting to any of the other original options will cost more than adopting it in the first place. The greater this irreversibility, the more difficult it becomes to adapt eventually to the efficient policy option.

Accordingly, North (1990 p.80) advocated a criterion for policy or institutional choice called 'adaptive efficiency' that, in addition to the consequences considered conventionally in assessing economic efficiency, accounts for irreversibilities arising from options, as well as the learning potential they offer. Consistent with the concerns of adaptive management, he defined adaptive efficiency as 'concerned with the willingness of a society to acquire knowledge and learning, to induce innovation, to undertake risk and creative activity of all sorts, as well as to resolve problems and bottlenecks of the society through time' (ibid. p.80).

North (ibid. p.81) remarked that adopting an adaptive efficiency criterion would 'encourage the development of decentralized decision-making processes that allow societies to maximise the efforts required to explore alternative ways of solving problems'. Ostrom (1999 p.526) remarked similarly that a key advantage of devolved governance is that '[m]ultiple units are experimenting with rules simultaneously, thereby reducing the probability of failure for an entire region'.

Frey and Eichenberger (1999 p.16) identified five further ways whereby decentralization or devolution can accelerate policy experimentation and adaptation:

First, it is more likely that a majority of the population of one of the many small jurisdictions favours a certain innovation than the population of the whole country. Second, innovations under decentralization can be undertaken on an experimental basis within those jurisdictions where the conditions for success are most conducive and where the respective innovations are most desired. Third, voluntary experiments have higher success rates than when imposed from above. Fourth, a particular local jurisdiction finds it less risky to introduce new ideas … because the consequences are limited and can be controlled and influenced more easily. If the innovation proves a failure, not much is lost. Fifth, a successful innovation, on the other hand, will soon be imitated by other local units and will thus diffuse over the whole country.

Devolution also increases societal capacity to learn from these experiments, because it means that 'individuals who have the greatest interest in overcoming [NRM problems] learn the results of the experimentation with rules and can adapt to this direct feedback' (Ostrom 1999 p.525). A further disadvantage of a centralised approach to policy experimentation is that outcomes of centrally-designed experiments in different local settings may be contradictory and therefore difficult to interpret and learn from. This approach also impedes inductive learning in complex settings since it 'obscure[s] through aggregation and averaging … the patterns … of the system' (Wilson 2002 p.345).

Devolution can also offer benefits in terms of adaptive efficiency through allowing a better fit, compared with centralised decision-making, between the group of people affected by a decision and the group of people with rights to participate in that decision. Ostrom, Tiebout et al. (1999[1961] p.37) called these groups, respectively, the 'public' and the 'political community' for a particular decision. For most problems of collective action, the political community associated with centralised decision-making is appreciably broader than the associated public. This can lead to decisions ill-adapted to the interests of the relevant public, as explained below:

> [W]here the political community contains the whole public and, in addition, people unaffected by a transaction, the unaffected are given a voice when none may be desired. Capricious actions can result. The total political community in a city of three million population may not be an appropriate decision-making mechanism in planning a local playground (ibid. p.37).

A further important advantage of devolution is that it strengthens political competition. As observed by Frey and Eichenberger (1999 pp.3, 31):

> Elections … are not able to sufficiently restrict politicians' selfish behaviour. Therefore, institutional conditions have to be designed so that stronger incentives are imposed on politicians and governments to fulfil citizens' preferences. This can only be achieved by strengthening the political competition at all levels of government. … [Organizational units devolved policy functions] are subject to comparison and competition with other jurisdictions. The central state, in contrast, assumes a monopolistic position with respect to its inhabitants. … This privileged position makes it profitable for rent-seeking activities by organized pressure groups. The interests of [the general citizenry] and other weakly organized groups tend to be neglected in this rent-seeking struggle.

Nevertheless, there are limits to what can be achieved by devolution. For instance, local groups devolved responsibilities may find it difficult to bring together parties with a history of conflict,

enforce the choices they make, or raise the resources required to understand the problem and develop solutions. Ostrom (1999 p.528) argued that the way to address these limitations while maintaining adaptive capacity is through nested, or polycentric, organisational systems within which:

> Each unit may exercise considerable independence to make and enforce rules within a circumscribed scope of authority for a specified geographical area. … Self-organized resource governance systems, in such a system, … are nested in several levels of general-purpose governments that also provide civil equity as well as criminal courts.

Citizens can in this way retain many of the advantages of a devolved system. The overlapping of organisational units in nested systems can also contribute to adaptive efficiency. It can allow information about rules that have worked for one unit to be transmitted more easily to other units. Another key advantage of this overlapping is that 'when small systems fail, there are larger systems to call upon – and vice versa' (ibid. p.528).

The advantages of nested organisational systems for adaptive efficiency are commonly overlooked because they seem messy until effort is devoted to understand how they work. Ostrom, Tiebout et al. (1999[1961] p.31) observed that a 'multiplicity of political units … [is commonly diagnosed as] too many governments and not enough government'. Frey and Eichenberger (1999 p.214, original emphasis) considered a case of polycentric governance regarded by the relevant authorities as inefficient and found that 'this 'inefficiency' refers at best to administrative cost, but *in particular* does not take into account the benefits by supplying more closely to the citizens' preferences, and neglects the better adjustment to changing circumstances of the future'.

3.   PRELIMINARY DESIGN PRINCIPLES FOR ORGANISATIONAL NESTING IN AUSTRALIAN WATERSHED MANAGEMENT

The aim in this section is to propose a *preliminary* set of design principles for successful application of the concept of nesting to Australian watershed management programs. The proposed set owes much to the earlier efforts of McKean (2002) and Reeve (2003) in this direction, to the various authors who have worked on identifying design principles for successful common property management of common-pool resources (Agrawal 2002; Baland and Platteau 1996; McKean 1992; Ostrom 1990; Wade 1988), and to Uphoff, Esman et al. (1998) for their work in identifying factors explaining success in 30 developing-country programs of community-based rural development. The preliminary status of the set must be stressed.

3.1   Designing structure

3.1.1   Base-level units

With nested hierarchy growing organically from a foundation of small-group voluntary cooperation, it is important for this foundation to be solid. As McKean (2002 p.8) has reasoned, '[t]he mutual gains to be reaped from cooperation are the essential building block, so it is critical to assemble the lowest units using this principle …'.

In the context of concern here, these mutual gains arise from progress achieved in solving natural resource management (NRM) problems in watersheds for which the solutions are collective goods. Most obviously, they arise when solutions for the NRM problems focused upon – e.g., stream sedimentation – are successfully implemented. Less obviously, they arise from successes in addressing each of the tasks that must be completed before a solution can be devised and its implementation can occur.

A base-level unit of this nature is known as a common property regime, since the (property) right to decide how the problem will be managed is shared by all unit members. As a result of extensive case-study research of common property regimes, consensus has emerged regarding a set of design principles that help to explain cases where common property regimes have succeeded in sustaining the levels of trust, reciprocity and voluntary cooperation needed to overcome their collective action problems over an extended period. (See Agrawal (2002) for an amalgamated set of these design principles.) A number of these design principles are pertinent for selecting the base-level units of a nested hierarchy, and thus appropriate for inclusion as preliminary design principles for nesting in Australian watershed management. These principles are listed below after the earlier-mentioned principle nominated by McKean (ibid.):

- The members of each base-level unit reap mutual gains from cooperating.
- Each unit contains relatively few members.
- Members of each unit share a similar cultural background.
- The members of each unit have worked together successfully in the past.
- The identities and interests of the members of each group are similar.
- The endowments and skills of the members of each group are dissimilar.

In respect of the principle listed second, Uphoff, Esman et al. (1998) found that the common size of base-level units in the rural development programs they reviewed was between 10-20 members.

3.1.2   Boundaries

Where managing a natural resource system constitutes a collective good, a foundational step in organising that management involves defining the boundaries of the system and of the group authorised to use it. As Ostrom (1992 p.69) explained:

> [I]f either of these boundaries is unclear, no one know what is being managed or for whom. Without defining the boundaries of a system and closing it to outsiders, local [resource users] face the possibility that any benefits they produce by their efforts will be reaped by others who do not contribute.

She proposed accordingly a design principle for successful common-property management of CPRs along the lines following: Individuals with rights to withdraw from the CPR to be managed are clearly defined, as are the boundaries of the system itself (Ostrom 1990).

Since a nested system of watershed management contains multiple common-property regimes, it follows in such a system that this design principle would apply to each of the common-property regimes involved. To illustrate, consider a two-tiered nested system for management of a hypothetical irrigation scheme. This scheme consists of two supply channels, A and B, fed from the same stream. The offtake for channel A is upstream of that for channel B, so stream flows reach the former before the latter. In addition, a reservoir has been constructed upstream of the channel A offtake to allow modification of the temporal pattern of stream flow reaching the two offtakes in order that it matches more closely the temporal pattern of irrigation demands along the channels they serve.

Now, the individual irrigators supplied by channel A share an interest in ensuring its maintenance, just as the individual irrigators served by channel B share an interest in that channel's upkeep. Hence, irrigators within each of these groups would reap mutual gains by cooperating to ensure that their respective channel is maintained. Let us assume that each of these groups satisfies the other five preliminary design principles proposed in Section 3.1.1, and that they are consequently well-suited as base-level units of a nested system. Furthermore, both groups share an interest in ensuring that the reservoir is maintained, and would reap mutual gains from cooperating towards this end. This cooperation could be organised by a federal, scheme-level group which nests the two channel-level groups.

This hypothetical nested system comprises three common property regimes (the two channel-level units plus the scheme-level unit), and Ostrom's design principle seems equally applicable to all three. It requires the two channel-level units to specify clearly the boundaries of their

respective channel systems, as well as the individuals authorised to withdraw water from them. It requires also that the scheme-level unit define clearly the boundary of the reservoir system and the groups that are authorised to make use of that system.

The foregoing discussion suggests the following preliminary design principle for nesting in watershed management:

- Individuals/groups with rights to withdraw from the resource system managed by any unit within a nested hierarchy are clearly defined, as are the boundaries of the system itself.

3.1.3 Rules

Although closing the boundaries for a natural resource system is important, it does not prevent those authorised to withdraw from the system increasing their withdrawals and frustrating conservation objectives. Ensuring conservation requires rules limiting the rates at which withdrawal rights are exercised. Ostrom (ibid.) found that the successful regimes of common property she studied were characterised by systems of rules ensuring that individuals/groups gain access to the benefits of management at least roughly in proportion to their contributions, whether monetary or in-kind, towards its costs. She found also that the successful regimes had achieved this result by matching their rule systems to their local circumstances. On the basis of this evidence, she proposed a design principle for successful common-property management of CPRs along the lines following: Rules specifying each individual's withdrawals from a CPR are related to local conditions and to rules specifying each individual's required contribution towards the costs of managing the CPR.

With a nested system of watershed management containing multiple common-property regimes, as discussed in the previous section, it follows that this design principle would extend in such a system to each of the common-property regimes involved. To illustrate, consider the hypothetical nested system discussed in the previous section. According to this principle, each of the two base-, or channel-, level units would devise rules suited to their respective local circumstances that allocate each authorised irrigator in their jurisdiction a right to withdraw a volume of water from its channel. This volume would at least be roughly proportional to the irrigator's contribution towards the costs of maintaining the channel and supplying water. The federal, or scheme-level, unit responsible for maintaining and operating the reservoir would, in addition, devise rules suited to its wider circumstances that allocate each channel-level unit a right to withdraw a volume of water from the stream below the reservoir. This volume would at

least be roughly proportional to the channel-level unit's contribution to maintaining and operating the reservoir.

This discussion suggests the following preliminary design principle for nesting in watershed management:

- For each organisational unit in a nested hierarchy responsible for a particular CPR system, the rules specifying each individual's/group's permitted withdrawals from that system are related to local conditions and to rules specifying each individual's/group's required contribution towards the costs of managing that system.

Note that this preliminary design principle says nothing about the rights of lower-level units in a nested hierarchy to hold a higher-level unit accountable for the costs it charges them for acting on their behalf. Without such accountability, the possibility exists for a higher-level unit to source aggregate contributions from lower-level units that exceed the aggregate cost of acting efficiently on their behalf. Regardless of how this excess is utilised at the higher level – e.g., in 'empire building', 'feather-bedding' or illicit payments to officials – the success of nested community-based NRM will be compromised. Such accountability is best maintained by ensuring that lower-level units can participate in the higher-level processes where the rules affecting them are determined. A preliminary design principle to this effect is proposed in Section 3.2.7.

3.1.4   Subsidiarity

The principle of subsidiarity has been identified by a number of analysts as a key design principle for community-based NRM in Australia (Marshall 2001; McKean 2002; Young, et al. 1996). Pope Pius XI was the first to refer to the principle by this name in Encyclical *Quadragesimo Anno* (1931), formulating it as follows:

> It is an injustice and at the same time a grave evil and disturbance of right order to assign to a greater and higher association what lesser and subordinate organisations can do. For every social activity ought of its very nature to furnish help to the members of the body social and never destroy and absorb them.

This principle is now generally understood as requiring that each decision-making function be devolved to the lowest level of social organisation at which it can be exercised satisfactorily. It gained widespread exposure when Schumacher (1973) included it in his well-known book *Small is Beautiful* as one of five principles for large-scale organisation. In his interpretation, the principle

implies that the onus should be on those who seek to deprive a lower level of a function to prove that this level lacks the capacity to exercise this function satisfactorily *and* that a higher level could do significantly better.

When the nations of Europe decided to establish new forms of federalism when creating a 'European Community', the subsidiarity principle was used to describe the relationship envisaged between nations and Community-wide authorities. It was established in the Maastricht Treaty in 1992 and became effective with the signing of the Amsterdam Treaty in 1999 (Frey and Eichenberger 1999).

Common property scholars like McKean (2002) interpret the subsidiarity principle to mean that each individual organisational unit should be left free to make all decisions that do not affect anyone in another unit. The right to make a decision affecting members of other units is thus relocated justifiably to a higher-level unit comprised of all the people with an interest in the consequences (i.e., costs and benefits) of the decision, thus aligning the 'political community' for a decision with its 'public'. The outcome of locating functions in this way is a nested hierarchy wherein the scale of interests for each decision neatly matches the scale of the unit to which it is assigned (Wilson 2002).

It follows from the subsidiarity principle that decisions taken at one level should limit the autonomy of lower levels to the minimum extent necessary. Decisions should therefore focus on standards or targets that lower units need to meet for the core outcomes associated with NRM goals to be satisfied, rather than on the means to be used by lower units in achieving these outcomes (McKean 2002). As highlighted by Reeve (2003), it is necessary to restrict the autonomy of any unit in implementing higher-level decision to options not affecting members of other units. He provided an example of irrigators in one area (area 1) deciding to sell all their water entitlements to irrigators in another area (area 3). However, irrigators in a further area (area 2), until then sharing with area 1 irrigators the cost of maintaining a jointly-used supply channel, would be disadvantaged by this decision. The subsidiarity principle requires that the decision be made by a unit comprised of all those with an interest in the decision, i.e., one nesting or federating the units for areas 1 and 2. Area 2 irrigators might agree during the negotiations facilitated by this federal unit to allow area 1 irrigators to sell their entitlements provided compensation is paid for the additional costs this would impose on the first group.

The foregoing discussion presupposes that the organisational capacity already exists to allow neat matching between the pattern of units in a nested hierarchy and the pattern of interests

associated with the decisions faced by the hierarchy. As we have seen previously, however, the provision and maintenance of organisational capacity for anything other than small-group problems normally constitutes a significant problem of collective action. Hence, it will not always be the case that a formally organised unit well-matched to the scale of a particular decision problem, and equipped with the other capacities required to address that problem satisfactorily, exists already or can be established in the short term.

It will sometimes be necessary to choose in the shorter term, therefore, between allocating a given decision function to a higher-level unit covering a scale wider than that of the problem at issue, or to lower-level units (including individual households or firms) that jointly cover the scale of the problem but singly cover only parts of it. The subsidiarity principle requires in such cases that the function be allocated to the higher level only if impartial assessment finds that the lower-level units have no reasonable prospects of self-organising to perform it satisfactorily *and* that the higher-level unit could perform it more satisfactorily. As Ostrom, Tiebout et al. (1999[1961]) observed, it is a mistake to conclude that formal units at a certain level are too small for a given problem until informal organisational arrangements, scaled to match the problem, are properly investigated. Indeed, many problems do not warrant the effort and cost of establishing a formal organisational unit to deal with them: '[T]he feasible number of governmental units is limited compared with the number of public goods to be provided' (ibid. p.40).

Nevertheless, impartial assessment of such choices poses its own challenges. It involves predicting how units at different organisational levels will perform a given function relative to one another, and this depends in turn on some kind of theory. To the extent that the theory used is founded on value judgements and beliefs predisposing it towards predictions biased in favour of a particular level of organisation, its use to predict the performance of that level compared with other levels will not be impartial. This observation is pertinent here because theories associated with the New Public Management (e.g., agency theory) continue to exert a strong influence on how watershed management is organised in Australia. Due to their grounding in the Progressive policy paradigm, these theories are biased in favour of centralising – not only *to* the state but *within* it – all decision functions not suited to resolution through market transactions. It is not difficult to see how the subsidiarity principle would be subverted if administered through the lens of such theories. Judging by the following remark from Frey and Eichenberger (1999 pp.59-60), this subversion has occurred already in the European Community:

> The Amsterdam Treaty … only stipulates that the EC [i.e., European Commission], while extending its fields of activity, is bound to argue that the extension of its tasks is consistent

with the principle of subsidiarity. However this is not a strong constraint to centralization. There is hardly a government activity for which it cannot be argued that it causes some transnational spillovers or overcharges at least one national government. Therefore the EC can always argue that centralization is compatible with the subsidiarity principle.

Berger and Neuhaus (1996 p.148) explained the continuing hold of the Progressive policy paradigm (referred to also as the 'paradigm of the welfare state') in the following terms:

The old paradigm of the welfare state continues to haunt the political discourse. … People who have thought according to this formula for many years are not easily induced to look at reality in new ways. But there is more at stake here than sluggish mind-sets. Very large and powerful vested interests have grown up around every policy of the welfare state. The paradigm shift suggested by [the subsidiarity principle[2]] directly threatens some of those interests. … Indeed, wherever anything like the [principle] has been tried, the resistance has been fierce.

A common resistance strategy utilised by vested interests associated with an existing power structure involves opportunistic devolution of government functions. Hence, '[f]iscal crisis and ensuing economic reform policies often provide the greatest impetus to devolution policies' (Katon, et al. 2001 p.1). Not infrequently, the outcome is devolution of responsibility to perform a function without reallocation of the resources needed to discharge it effectively. Those in power thereby 'make the best of adversity'. The inconsistency of this approach with the subsidiarity principle is highlighted by the following remark from Ostrom (2000 p.21):

It is one thing to self-organize to create your own property and slowly develop the rules of association that enable a group to benefit from long-term management of that resource. It is quite something else to have a government tell you that you now have to manage something that the government can no longer handle itself!

In various ways, therefore, vested interests pose a formidable obstacle to designing devolution programs in accordance with an impartial reading of the subsidiarity principle. For this obstacle to be overcome, therefore, it is necessary not only to prescribe this principle as a basis for devolution policies but also to ensure that those responsible for interpreting and enforcing this

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[2] The concept of 'mediating structures' is actually mentioned at this point. As discussed by these authors, this concept descends from the subsidiarity principle. This concept is discussed in Section 3.2.11.

requirement in particular contexts are somehow 'quarantined' from the existing power structure. Clearly, this is easier said than done.

Vested interests with reason to resist impartial application of the subsidiarity principle may emerge even within the ranks of community-based organisations. For instance, Jennings and Moore (2000 p.183) observed from the Australian experience of watershed management that '[p]ower-sharing is an issue not only between regional groups and those 'above' them such as state and federal government. It is also an issue between the groups and smaller, locally-based community groups'. From their review of rural development programs, Uphoff, Esman et al. (1998 pp.67-8) found similarly that '[t]here is an ever-present danger when small groups are federated that they will be dominated by higher levels of the organisation. This hazard should be forthrightly acknowledged, and steps should be taken to resist it'.

One possible strategy for circumventing vested interests in applying the subsidiarity principle, suggested by the comments of Frey and Eichenberger (1999) about the European context, involves enshrining the subsidiarity principle in law and providing every citizen and civil group with the right to lodge a formal complaint with the appropriate court of law if they feel the principle is being breached. In any case, the obstacle presented by vested interests deserves considerably more attention than it has received to date, at least if the subsidiarity principle is to become a design principle for nesting in watershed management.

The preceding discussion suggests the following as preliminary design principles for nesting in community-based watershed management:
•   Each decision problem is allocated to the lowest organisational unit with the capacity to solve it satisfactorily.
•   The preceding principle is applied impartially.

3.2   Designing process

The discussion of design principles to this point has said little about the problem of ensuring that the communication and learning needed to realise the advantages of nested hierarchies in terms of adaptive efficiency actually takes place. Young (2002) warned accordingly against focusing on the subsidiarity principle to the exclusion of the 'co-management' concept when designing organisational structures for complex environmental problems. This concept is concerned explicitly with the relationships needed for effective communication and learning. Berkes (2002 p.304) characterised co-management accordingly 'not as an end point, but as a

process of mutual learning in which each side learns from and adjusts to the other over a period of time'.

Young (2002 p.284) remarked that '[e]xperience on the ground with co-management is limited, and we are far from the formulation of well-tested propositions about the determinants of success and failure in the creation of co-management regimes'. Nevertheless, we might take heart from his observation that '[i]n most cases, the key to success lies in allocating specific tasks to the appropriate level of social organization, and then taking steps to ensure that cross-scale interactions produce complementary rather than conflicting actions' (ibid. p.263). The design principles discussed already are concerned with the first, structural, problem. However, other design principles are needed to help with the second, procedural, problem. As Uphoff, Esman et al. (1998 p.71) found:

> [M]erely establishing a desirable structural form of organisation is [no] guarantee of success. … How local organisations operate is crucial … The potential benefits of solidarity and scale deriving from a multitier structure may not be realised if experimentation and revision are not encouraged, and if motivation is lacking or misdirected.

To process-oriented design principles we therefore now turn.

3.2.1 Catalysing voluntary cooperation

It will not be uncommon for parties with an interest in a new problem to lack trust in one another at the outset, either because they begin as strangers or because their previous interactions were unrewarding or even mutually damaging. In addition, it will not always be possible to design base-level and other organisational units so that their membership accords with the design principles conducive to establishing mutual trust that were proposed in section 3.1.1. Drawing upon studies by Uphoff and his colleagues, for instance, McKean (2002) discussed the efforts of the Sri Lankan government, after that country became independent, to revive irrigation systems abandoned centuries previously. The largest of these efforts in the 1950s focussed on the Gal Oya district which:

> … was afflicted by a severe ethnic split, with richer Sinhalese upstream and poorer Tamils downstream, reinforcing the very damaging social stratification that causes violence in Sri Lanka to this day. Sure enough, by the 1970s the Gal Oya project was also a physical mess, with its works breaking down in disrepair because the farmers served by the scheme were

not self-organizing to repair the works, and hostility between the farmers and the government's Irrigation Dept (sic) was at a peak (ibid. p.16).

The experience in this case demonstrates the pivotal role that 'human catalysts' can play in helping to turn around situations with entrenched mistrust. Given the failure of its own efforts, the Sri Lankan government turned the Gal Oya project over to an international agency interested in farmer self-organisation, and this agency began collaborating with a research group led by Uphoff. The ensuing process was summarised as follows:

> [The research group] rejected the government's original design for autocratic and top heavy design of rules and enforcement. [It] introduced teams of organizers, recruited and trained locally, who spent all their time meeting with the farmers and getting the farmers to meet with each other to identify small physical problems and work on them in small units … Thus the … project focussed on the problems that the farmers themselves identified as the important stumbling blocks. Each small success improved the confidence level of the farmers and led to a larger success. In this way, the project and the farmers struggled, from the bottom up, to create social capital where there was none. … The … project achieved a remarkable turnaround in the functioning of the system and agricultural production, in farmer confidence about tackling all sorts of other problems, and eventually in the government's new found respect for these farmers (ibid. p.17).

The preceding discussion suggests a preliminary design principle along the following lines for nesting in watershed management:

•   Human catalysts are utilised to establish platforms from which trust and voluntary cooperation can begin to grow.

3.2.2   Formalising organisational processes

Uphoff, Esman et al. (1998 p.74) found that the successful rural development programs they studied had avoided unnecessary formalisation of their organisational processes (i.e., operations and procedures). In these programs, organisational processes were kept as simple and transparent as possible; for instance, by minimising the use of legal instruments, keeping transactions simple and basing them on mutual trust and shared responsibility, and maintaining openness in negotiations. As they noted, organising on an informal basis in the beginning helps to avoid situations where a 'supply' of organisation is offered to people before they feel a 'demand' for it. Thus, '[p]rogress should not be rushed. Putting a nominal organisation in place

does not accomplish much unless the processes that it seeks to institutionalise acquire a vitality of their own' (ibid. p.75).

For long-term problems, however, formalisation of organisational arrangements to some degree usually becomes advantageous at some stage: '[G]roups that have become a social reality also need a legal personality, through incorporation according to the law or through government recognition and enrolment that entitles the group to defined rights' (ibid. p.75). Organisations need such recognition in order to open bank accounts, take loans, make contracts, and uphold their interests in courts.

In particular, it becomes necessary as larger amounts of financial resources become involved to establish better-defined and legally-sanctioned roles and accountability procedures. Thus:

> Backing simplicity and transparency up with formal or legal requirements, audits, inspections, and reporting gives everyone more confidence, detects and rectifies and errors, and reduces temptations to misuse funds. Some degree of formality can make the informal procedures work better, without compromising the potential for local control of the program (ibid. p.103).

This discussion suggests the following preliminary design principle:

• Organisational processes are formalised only as the need arises.

3.2.3 Pacing organisational growth

Watershed management organisations can require considerable self-discipline to avoid being rushed into expanding too rapidly. Governments are unable increasingly to keep up with the rate at which NRM problems in watersheds are emerging and worsening, so are under increasing pressure to devolve their functions in these areas regardless of the capacities of community-based organisations to perform them satisfactorily. Furthermore, governments tend to overestimate the pace at which such organisations early in their life cycle can build their capacities to perform more demanding functions. Uphoff et al. (ibid. p.33) observed that this tendency:

> … comes mostly from a linear way of thinking about schedules, expecting to accomplish equal amounts of work during each time period, rather than having a logistic (S-shaped) curve in mind. [With this latter perspective] one is willing to begin slowly, gain knowledge and experience, and build up a cadre of capable and dedicated personnel, with the

expectation that at some point a critical mass will be achieved and work can be accelerated productively.

It is important, therefore, that decisions about the pace at which community-based groups take on new functions be made by, or at least with, their members. Group members are best placed to judge their collective capacities at any time and predict how these capacities are likely to develop. Meanwhile, governments need to avoid placing community-based organisations in a position where in effect they have little say in when new functions will be taken on; e.g., where a government decides unilaterally that it will withdraw from certain functions and offer resources to organisations representing the functions' public in return for them taking over these functions within a prescribed period.

This suggests the following preliminary design principle:

- Decisions about the pace at which organisational units take on new functions are made by, or at least with, their members.

3.2.4   Purposefulness

Organisations are established for particular purposes. Procedures are developed to expedite the attainment of those purposes. However, Uphoff et al. (ibid. p.72) observed from their review of rural develop programs that an 'all too common' scenario involves 'procedures com[ing] to dominate purposes'. This presents a challenge, firstly, because problems and purposes evolve. Secondly, members of such organisations vary in their capabilities, 'so always insisting on the same routines or performance is not necessarily the most effective way to attain goals' (ibid. p.72). The best way to address this challenge, according to these authors, is to maintain 'purposefulness as the overriding norm, so that the form of action does not subordinate the substance of the results. Programs need to evaluate continually their means in relation to their ends and to assess whether their ends remain valid' (ibid. p.72).

This suggests the following preliminary design principle:
- Procedures adapt with an organisation's purpose and its members' capacities.

3.2.5   Recruiting leadership

Uphoff et al. (ibid. p.73) found as follows that one of the most important process variables for the performance of community-based organisations concerns recruitment of leadership: 'The

kinds of persons who come to fill the responsible roles in these organisations have as much influence on performance as the structuring of these roles – their authority, their control over financial resources, and so forth'. These authors observed that the ranks of rural leadership often look thin because of a tendency for leadership opportunities to be monopolised by well-connected or well-born persons, leaving few persons with a chance to demonstrate and develop their capacities in this area. They found that when opportunities are created for a diversity of people to gain experience in positions of responsibility, 'more capable and well-motivated persons emerge than was originally expected' (ibid. p.74).

These authors described a traditional Japanese system of rotating the leadership of base-level groups among the heads of all households. This allowed all household heads to get a turn at demonstrating their leadership talents. If any lacked such talents, the repercussions were limited to a small group for a limited time. Those who revealed talents at leadership were chosen for higher-level leadership roles. These authors proposed that this kind of leadership recruitment system be adapted to build leadership capacities elsewhere, reasoning that '[t]he cost of having poor management for some groups at any time can be more than compensated for by having a larger pool of leadership to fill higher-level positions throughout the organisation' (ibid. p.74).

They recommended accordingly that the concept of leadership in community-based programs be expanded:

> … from one fixated on the most visible individual to a more collective vision of leadership. … [For] the top leadership of a program … to be effective, there must be comparable and reinforcing ideals and articulations leading to decisions and actions at multiple levels, all the way down to the grassroots (ibid. pp.45, 57).

The foregoing discussion suggests the following preliminary design principle:

•   Strategies are devised to develop leadership capacities across all organisational levels.

3.2.6   Learning

Uphoff et al. (ibid. p.208) found from their review of rural development programs that '[f]or the long run, the most important criterion of success and sustainability is that the program and associated organisations remain continually in a learning mode'. This finding is consistent the arguments put forward by Senge (1990) for adopting a 'learning organisation' model when faced with complex problems. A learning organisation is one in which 'people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are

nurtured, where collective aspiration is set free, and where people are continually learning how to learn together' (ibid. p.3).

Becoming and remaining a learning organisation is itself a complex challenge. Beliefs established early in an organisation's life can become mistaken for reality. Moreover, the vested interests that grow around structures and procedures based on these beliefs become obstacles to any learning that would threaten them. Addressing this challenge is a vital task of leaders throughout an organisational system. As Senge (ibid. p.340) observed, 'learning organizations will remain a 'good idea', an intriguing but distant vision until people take a stand for building such organizations. Taking this stand is the first leadership act …'.

This discussion suggests the following design principle:

- Leaders at all levels focus on establishing and maintaining their own units, together with the nested system as a whole, as learning organisations.

3.2.7   Participatory decision-making

Uphoff, Esman et al. (1998 p.76) found that:

> Participation … is perhaps the most central feature of successful rural development. Organisational structures and roles should be fashioned to support ongoing processes of participation that enlist people's ideas and ideals as well as their material contributions and management skills.

This finding is consistent with what scholars have identified as a design principle for successful common property regimes. Perhaps the best-known version of this design principle is: 'Most individuals affected by the operational rules can participate in modifying the operational rules' (Ostrom 1990 p.90). The contribution of this design principle to organisational success was explained by its proponent as follows: '[I]nstitutions that use this principle are better able to tailor their rules to local circumstances, because the individuals who directly interact with one another and with the physical world can modify the rules over time so as to better fit them to the specific characteristics of their setting' (ibid. p.93). Participation in a decision process by those expected to comply with the decisions reached can also contribute to success by increasing trust in the decision process and thus voluntary cooperation in implementing the decisions reached – thereby increasing the chances of keeping the costs of monitoring and enforcing compliance low enough to be affordable (Marshall 2004).

Inclusive participation needs to be actively planned for and pursued. As Uphoff, Esman et al. (1998 p.83) observed: 'One should not assume that participation will automatically or easily 'bubble up' from below'. By no means does devolution of rights to participate in decision making guarantee more inclusive participation. If the rights are devolved passively, it should come as no surprise that they will be taken up most vigorously by segments of the population already empowered to participate in public decision-making processes (e.g., by lobbying politicians or presenting their arguments through the mass media). Inclusive participation will not occur unless active steps are taken to empower the groups traditionally excluded.

More inclusive does not mean fully inclusive: 'Participation … has costs as well as benefits, so maximum participation is not likely to be desirable. These costs in terms of time, foregone income opportunities, and money and other contributions and in tensions with neighbors can become excessive relative to their associated benefits' (ibid. p.76). These authors argued accordingly in favour of the concept of optimum participation, and proposed that the optimum in any setting should be determined by those whose participation is sought.

This discussion suggests the following preliminary design principle:
- Inclusive participation in decision-making at each level is actively promoted, with the optimal degree and mode of participation in any setting decided by those whose participation is sought.

3.2.8   Monitoring and enforcement

Even good rules devised through an inclusive participatory process do not guarantee a critical mass of voluntary compliance. Nevertheless, Ostrom (1990 p.93, original emphasis) observed that '[t]he problem of gaining compliance to the rules … often is assumed away by analysts assuming powerful *external* authorities who enforce agreements'. In the successful cases of common property governance of natural resources she reviewed, in contrast, monitoring and enforcement were performed *internally*, i.e., by the members of the common property regimes. She noticed that participation of the members of each regime in its decision-making helped to ensure that the rules chosen were ones that could be monitored by the members, or any 'monitors' they appoint, at relatively low cost. It helped also in finding locally-effective ways of motivating regime members and any appointed monitors to impartially monitor the rules and report and infractions observed.

She noticed also that these organisations' costs of enforcement (i.e., of sanctioning infractions) were typically kept low in these cases by applying systems of 'graduated sanctions'. In such systems, the penalties for initial infractions are usually low. This recognises that '[e]veryone can make an error or can face difficult problems leading them to break a rule' (Ostrom 2000 p.151) and that a large punishment 'imposed on a person with an unusual problem may produce resentment and unwillingness to conform to the rules in the future' (Ostrom 1990 p.98). The possibility of imposing low penalties also increases the likelihood that individuals will monitor and sanction one another, since many individuals may be reluctant to impose substantial penalties on others in their community for fear of threatening their social networks. At the same time, low initial sanctions can be significant in deterring infractions. This is because, firstly, '[t]hey convey information to the offender that someone else in a similar situation is likely to be caught', and thereby increase the offender's trust that enough others will comply to make his or her own compliance worthwhile (ibid. p.98). Secondly, individuals incurring a minor penalty for a current infraction will be aware that the same leniency is unlikely next time, thus making them seriously think twice about infringing again. Thirdly, even a minimal level of punishment carries with it a loss of reputation that many individuals in small communities would be loath to risk due to social humiliation or exclusion they may suffer as a result.

Sturgess (1997 p.17) illustrated graduating sanctioning with the following example from an inshore fishery of New South Wales[3]:

> At the lowest level, a fisher breaching local rules would be 'spoken to', whether informally on the water or more formally following a meeting between the fishers from the affected area. … [W]here the offending behaviour persists, the fisher will be ostracised, perhaps finding access to a lake blocked by the cars of other commercial fishers, or being denied access to a private coolroom ... While there is a general reluctance on the part of commercial fishers to complain to fisheries inspectors, this remedy will also be pursued from time to time, particularly where the offenders come from outside the local region and normal methods of 'education' or shaming are likely to be ineffective.

The foregoing discussion suggests the following preliminary design principles for nesting in watershed management:

- The rules set by any organisational unit are monitored by the members of that unit or by agents appointed by and accountable to the members.

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[3] A state of Australia.

- Members of an organisational unit who infringe its rules are subject to graduated sanctions assessed and imposed by other members and/or by agents appointed by and accountable to the members.

3.2.9 Conflict resolution

Due to bounded rationality, it is rarely the case in complex settings that rules can be defined anticipating all possible contingencies. Application of rules in such settings is therefore rarely unambiguous. Ostrom (1990 p.100) remarked on the implications of this ambiguity as follows:

> For individuals who are seeking ways to slide past or subvert rules, there are always various ways in which they can 'interpret' a rule so that they can always argue that they have complied with the rule, but in effect subverting its intent. Even individuals who intend to follow the spirit of a rule can make errors. … If individuals are going to follow rules over a long period of time, there must be some mechanism for discussing and resolving what constitutes an infraction.

She remarked on the importance of keeping the costs of conflict resolution mechanisms as low as possible, so that access to them is maximised. In some of the cases she studied, the mechanisms were quite informal, with those selected as leader serving also as the basic resolvers of conflict. In other cases, she noted, the potential for serious conflict is so great that establishment of more costly and sophisticated formal mechanisms, including courts, is justified.

This discussion suggests the following preliminary design principle for nesting in watershed management:

- Conflicts within and between organisational units are resolved by mechanisms that are convened by the unit/s involved and designed to minimise costs and delays.

3.2.10 Recognition from government

When governments or their officials presume that only they have the right to set and administer the rules, the prospects of community-based organisations contributing towards their own governance will be seriously diminished. Even where such organisations are able to agree on rules for governing themselves in such a context, a disgruntled minority has the possibility of going to the government to get the rules overturned. A community-based organisation is better off, therefore, if government acknowledges and supports the level of autonomy it would be granted under the subsidiarity principle. This is the gist of the following design principle for successful common property regimes enunciated by Ostrom (1990 p.101): 'The rights of [CPR]

appropriators to devise their own institutions are not challenged by external governmental authorities'. Aside from not interfering with the rights of community-based organisations, governments can also play a positive role by supporting those organisations to discharge those rights efficiently and fairly.

Nevertheless, governments can be reluctant to support the growth of 'people power' that federation or nesting of grassroots organisations allows. As Uphoff, Esman et al. (1998 p.187) observed:

> When rural development organisations develop multi-tiered federated structures, they achieve, in addition to economies of scale, opportunities for advocacy. They can make the needs of their organisations and its members known to policy-making officials and politicians, lobby for favourable policies and allocations, and resist measures that they deem harmful.

Hence, '[p]oliticians are invariably concerned about the rise of mass rural organisations' (ibid. p.187) that nesting facilitates. It is not uncommon, therefore, for governments to try to derail efforts to scale up grassroots initiatives, for instance by trying to control the selection of leaders for community-based organisations, by trying to co-opt or 'buy off' the leaders selected by the grassroots, or by playing 'divide and rule' with the grassroots itself. Governments might otherwise attach conditions to their funding of community-based organisations that serve to alienate them from their members (e.g., requiring them to adopt bureaucratic procedures).

Even so, attempts by governments to impede growth in grassroots organisational capacity can be thwarted. As Uphoff et al. (ibid. p.176) observed:

> [P]owerful interests, even governments, can be outmanoeuvred, or sometimes simply outwaited, through strategies that take advantage of inherent or shifting sources of power. … Sustainable successes require maintaining a strategic long-term view and commitment, grounded on solid support from rural populations, and balanced by short-term tactical moves that build up goodwill and blunt attacks …

A consistent theme emerging from the programs they reviewed was that community-based programs 'must maintain benign relations with those power centres that can affect their operation and survival' (ibid. p.180). These authors observed further that maintaining such relations 'derives at least as much from demonstrating good results as it does from the campaigning or manoeuvring skills of top leadership' (ibid. p.180). They found accordingly that success 'can start with the cooperation of a few individuals in relevant positions of authority and

build from there. … With good performance, others who initially opposed the venture have reason to come around' (ibid. p.190).

This discussion suggests the following preliminary design principles for nesting in watershed management

•   Governments recognise the rights of watershed management organisations to devise and enforce their own rules.

•   Watershed management organisations pursue such recognition strategically, through successful performance, non-partisan political advocacy, and working with relevant officials who are prepared to work with them.

3.2.11 Deliberative decision-making

'Somewhere between top-down and bottom-up approaches to environmental management is a place called Regional Australia, also known as the middle ground or the great unknown and it is fast gaining political credibility as a cross between a black hole and a hot potato' (Carr 2002 p.97). This characterisation of arguably the key contemporary challenge to Australian watershed management accords with what Baland and Platteau (1996 p.351) identified in the following terms as a major problem for NRM policy internationally:

> In many cases, it is unrealistic to expect the State the deal with each user group because this would entail high transaction costs. There is consequently a need for intermediate organizations … These organizations have to be built up and cannot typically be derived from traditional institutions. Whether such a challenge can be met is a question of the utmost importance that cannot be answered today.

The challenge nowadays of finding a 'middle ground' capable of legitimising public decision-making was highlighted more generally by Berger and Neuhaus (1996[1977]). They remarked on how modernisation had brought about an unprecedented distancing of public and private life. They observed that '[m]any who handle [this political crisis] more successfully than most have access to institutions that mediate between the two spheres' (ibid. p.158). Without such institutions 'the political order becomes detached from the values and realities of individual life. Deprived of its moral foundation, the political order is 'delegitimated'' (ibid. p.159).

These authors proposed that this crisis might be mitigated if policy processes were to involve 'mediating structures' wherever possible. They defined mediating structures as 'those institutions that stand between the private world of individuals and the large, impersonal structures of

modern society' (Berger and Neuhaus 1996 p.148). They explained further that these structures 'fac[ed] both 'upward' and 'downward'. Their mediations were then of benefit to both levels of social life: the individual was protected from the alienation and 'anomie' of modern life, while the large institutions, including the state, gained legitimacy by being related to values that governed the actual lives of ordinary people' (ibid. pp.148-9).

Berger and Neuhaus (ibid.) noted that traditional mediating structures, such as neighbourhood committees and voluntary associations, had often become sidelined as a result of the Progressive state regarding them as parochial and divisive, and leaving them with little formal involvement in the design and implementation of public policy. Their preferred option for strengthening the role of mediating structures in public policy processes involves the state funding mediating structures to perform prescribed functions.

Marshall (2002 p.104) observed that '[t]he concept of mediating structure fits neatly with the original charter of [Australian watershed-management] organisations, viz. to foster voluntary cooperation between communities and governments in implementing solutions to natural-resources problems'. The original aim was for watershed management organisations to be established and operated in such a way that they would be perceived by farmers and other citizens as organisations that could and would account for local values and knowledge in making decisions, and which consequently would establish a level of trust among their constituents that agencies of centralised government could no longer hope to attain. Governments meanwhile, because they had helped form the catchment organisations and set parameters within which they would operate, could better trust that the decisions made by these organisations would accord with *their* values than would be the case with purely 'bottom-up' decisions. As mediating structures with a 'private face' as well as a 'public face', these organisations could offer valuable new opportunities for mediating trust and voluntary cooperation between governments and citizens.

Even though the contribution of the mediating structures concept to our understanding of public policy-making has been widely acclaimed, translating it into actual programs has not been straightforward. Berger and Neuhaus (1996 p.150) identified the problem as one of 'protect[ing] mediating structures from the fatal embrace of government regulation' and concluded that:

> Unless that problem is solved, … the very vitality that originally distinguished the
> institutions from government agencies is destroyed. Indeed they *become* government
> agencies under another name. … [W]e underestimated the degree of corruption that
> comes with government funding – … the … insidious corruption in which these

institutions reshape themselves to continue as beneficiaries of government largesse. …

The deformation of mediating structures by this creeping process of 'governmentalization'

must be at the center of any rethinking of social policy (ibid. pp.150-1, original emphasis).

Marshall (2002 p.104) remarked in this vein that '[t]he concept of mediating structure … helps to understand the reluctance of some commentators to see some of the regulatory rights and responsibilities of governments devolved to [Australian watershed-management] organisations'.

In discussing how mediating structures might be protected from government's fatal embrace, Berger and Neuhaus (1996) indicated only that this protection would entail a package of legislative and policy mechanisms. The focus of such mechanisms would need to be on ensuring that the organisations intended to function as mediating structures can continue to mediate the values of governments and citizens and thereby help to build and maintain mutual trust between them. Without such a focus, even grassroots organisations can cease functioning as mediating structures and become 'simply branches of mega-institutions, or … simply [an] enclave of private meanings and lifestyle with no relation to the wider society' (ibid. p.149).

For Carr (2002 p.219, original emphasis), successful Australian execution of this focus on mediating values and trust lies in the adoption of deliberative approaches to public decision-making wherein 'dialogue and exchange [occurs] *on an equal footing* between top-down and bottom-up approaches to environmental sustainability'. Deliberative discourse relies on 'establishing conditions of free public reasoning among equals who are governed by the decisions' (Cohen 1998 p.186). Advocates of this approach argue that it can help dissolve conflict, and establish trust and cooperation in its place, by promoting social learning. Thus:

… on the one hand, people (and collectivities) may come to abandon or relinquish priorly

held perceptions and claims …; and, on the other hand, they may accede to new

perceptions, convictions and motivations. … It is precisely the fluid, unfinished,

ambiguous process of inter-subjective communication … that permits the emergence of

novel perspectives of coexistence and compromise (O'Connor 2000 p.5).

Establishing and maintaining the conditions required for 'free public reasoning among equals' is of course no easy matter at a time when, despite considerable rhetoric to the contrary, adherence to the Progressive or top-down approach to policy discourse remains formidable within governments, the scientific establishment, and in civil organisations used to working under this approach (e.g., farmer and environmental lobby groups). Although legislative and policy mechanisms may assist in effecting a shift towards deliberative approaches, it seems therefore that achieving a critical mass of adherence to such approaches will not occur without systematic

and sustained leadership in this direction. Bellamy, Ross et al. (2002 p.34) highlighted this need in Australian watershed management as follows:

> … [H]uman communication and organisational culture … determine the capacity for effective partnership and therefore effective outcomes. However there has been little attention in [Australian catchment-management] initiatives to the deeper systemic cultural change required within bureaucracies and communities for [these initiatives] to succeed. … Change and change management are needed for all stakeholders to adjust to working together through partnerships. … It has been demonstrated that the more successful … approaches embody a heightened awareness of these characteristics, which are usually facilitated through a particular community or agency 'champion' of process.

The successful rural development programs reviewed by Uphoff, Esman et al. (1998) offer hope that such cultural change can occur. They found in a number of the programs reviewed that the 'fatal embrace of government' had been avoided as a result of the conditions attached to government support not being 'determined unilaterally, but rather in consultation with representatives of those groups whose participation and advancement are sought' (ibid. p.36). When devised in this deliberative manner, such conditions can 'encourage and even enforce among recipients a level of discipline and an assumption of responsibility that puts them in a better position to be self-managing and self-sustaining' (ibid. p.36).

This discussion suggests the following preliminary design principle for nesting in watershed management:

• Government and community leaders expedite the cultural change needed to ensure that decisions within and about watershed management organisations occur through deliberative processes in which top-down and bottom-up inputs enjoy equal standing.

3.2.12   Leading by example

Leaders have a vital role to play in acting as role models for the kinds of behaviours they are promoting. As Kotter (1995 p.64) observed, '[c]ommunication comes in both words and deeds, and the latter are often the most powerful form. Nothing undermines change more than behaviour by important individuals that is inconsistent with their words'. For instance, Uphoff, Esman et al. (1998 p.95) found from the programs they studied:

> … how important it is, if egalitarian and participatory farmer organisations are to be fostered, that the agency promoting them exhibit such values and modes of operation. It

needs to project into its surroundings both visible examples and mental attitudes that support the kinds of relationships it expects to emerge. If local organisations are to be self-managing, the personnel working with them should likewise be to a significant extent self-managing.

This suggests the following design principle:

•   Leaders at all levels act as role models for the behaviours they seek to promote.

3.3   Preliminary design principles for organisational nesting in Australian watershed management

The preliminary design principles proposed in Sections 3.1 and 3.2 for organisational nesting in Australian watershed management are brought together in Table 1. It can be seen that 24 such principles have been identified. Of these, 10 are structure-related principles and 14 are process-oriented principles.

4.   CONCLUDING COMMENTS

The preliminary set of design principles for organisational nesting in Australian watershed management presented in Table 1 will hopefully stimulate the process of questioning and discussion needed to move towards a set that could be recommended with some confidence to those responsible for policy development in this area. Nevertheless, identifying design principles for an organisational problem as complex as this is itself highly complex (Agrawal 2002), so considerable humility will always be required in recommending that any such set be applied to any particular context. Indeed, it is appropriate to regard any given 'generic' set, such as the one presented above, as no more than a source of hypotheses to be tested and refined in particular contexts in an ongoing process of adaptive management.

Some readers might question whether the preliminary set of design principles presented above for Australian watershed management is any less applicable to watershed management outside Australia. Certainly, most of the literature reviewed in the process of identifying the preliminary set was based on case studies undertaken outside Australia. However, the author's selection of this set is bound to have been influenced by his understanding of current organisational impediments in Australia to successful application of the watershed management concept. If '[t]he same institutional rules can have different effects on resource governance depending on variations in the biophysical, social, economic, and cultural contexts' (ibid. p.45), then it is

Table 1: Preliminary design principles for organisational nesting in Australian watershed management

STRUCTURE

1   Base-level units
     a   Members of each base-level unit reap mutual gains from cooperating.
     b   Each unit contains relatively few members.
     c   Members of each unit share a similar cultural background.
     d   The members of each unit have worked together successfully in the past.
     e   The identities and interests of the members of each group are similar.
     f   The endowments and skills of the members of each group are dissimilar.
2   Boundaries
     a   Individuals/groups with rights to withdraw from the resource system managed by any unit within a
          nested hierarchy are clearly defined, as are the boundaries of the system itself.
3   Rules
     a   For each organisational unit in a nested hierarchy responsible for a particular resource system, the rules
          specifying each individual's/group's permitted withdrawals from that system are related to local
          conditions and to rules specifying each individual's/group's required contribution towards the costs of
          managing that system.
4   Subsidiarity
     a   Each decision problem is allocated to the lowest organisational unit with the capacity to solve it
          satisfactorily.
     b   Principle 4a is applied impartially.

PROCESS

5   Catalysing voluntary cooperation
     a   Human catalysts are utilised to establish platforms from which trust and voluntary cooperation can
          begin to grow.
6   Formalising organisational processes
     a   Organisational processes are formalised only as the need arises.
7   Pacing organisational growth
     a   Decisions about the pace at which organisational units take on new functions are made by, or at least
          with, their members.
8   Purposefulness
     a   Procedures adapt with an organisation's purpose and its members' capacities.
9   Recruiting leadership
     a   Strategies are devised to develop leadership capacities across all organisational levels.
10   Learning
     a   Leaders at all levels focus on establishing and maintaining their own units, together with the nested
          system as a whole, as learning organisations.
11   Participation in decision-making
     a   Inclusive participation in decision-making at each level is actively promoted, with the optimal degree
          and mode of participation in any setting decided by those whose participation is sought.
12   Monitoring and enforcement
     a   The rules set by any organisational unit are monitored by members of that unit or by agents appointed
          by and accountable to the members.
     b   Members of an organisational unit who infringe its rules are subject to graduated sanctions assessed and
          imposed by other members and/or by agents appointed by and accountable to the members.
13   Conflict resolution
     a   Conflicts within and between organisational units are resolved by mechanisms that are convened by the
          unit/s involved and designed to minimise costs and delays.
14   Government recognition
     a   Governments recognise the rights of watershed management organisations to devise and enforce their
          own rules.
     b   Watershed management organisations pursue such recognition strategically, through successful
          performance, non-partisan political advocacy, and working with relevant officials who are prepared to
          work with them.
15   Deliberative decision-making
     a   Government and community leaders expedite the cultural change needed to ensure that decisions
          within and about watershed management organisations occur through deliberative processes in which
          top-down and bottom-up inputs enjoy equal standing.
16   Leading by example
     a   Leaders at all levels act as role models for the behaviours they seek to promote.

important that considerable caution be exercise before concluding that design principles judged likely to improve institutional performance in the Australian context will do the same elsewhere.

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