

How institutions elude design: river basin management and sustainable livelihoods

Frances Cleaver and Tom Franks

This paper challenges ideas that it is possible to 'get the institutions right' in the management of natural resources such as water. It engages with the literature and policy specifying 'design principles of robust institutions' and uses data from a river basin management project in Usangu, Tanzania, to illustrate the complexity of institutional evolution. The paper draws on emerging 'post-institutionalist' perspectives to reject over-formalised managerial approaches in favour of those which accept the processes and dynamic nature of institutional formation, and accommodate a variety of partial and contingent institutional solutions. Data from Usangu is used to show how the deep embeddedness of institutions in complex livelihoods renders external crafting problematic.

1. Getting institutions right.

Much theorising of collective action for natural resource management has focused on the importance of institutions as constraining and enabling structures in people's livelihoods. Institutions provide the incentives to shape the economic maximising behaviour of individuals in socially preferred directions, and the sanctions to punish those who cheat or free ride on the public good of collective action. Institutions can be shaped or crafted by external intervention and, providing due attention is paid to the structures (rules and roles) and norms (relations of trust and co-operation) contained within them, then collectively beneficial outcomes may be achieved (Uphoff 2000). These include optimising the output of the resource, sustainable use and management, and the generation of social capital. This model has largely been adopted in Sustainable Livelihoods literature where institutions are seen as critical channels through which people's livelihood strategies are shaped and mediated (Scoones 1998, Ellis 2000).

The idea of institutional crafting is epitomised in the work of Elinor Ostrom who specifies 'Design Principles' for robust and enduring institutions for common property resource management (Ostrom, 1990). Ostrom's ideas have spawned a vast amount of subsequent work empirically supporting the design principles through case studies. The literature tends to emphasise the formalisation of institutional arrangements, the codification of rules and regulations, the specification of clear authority structures and the strict exercise of sanctions against free-riders (Box 1). Overall there is a strong emphasis on transparency, on the principle of representation of users and on devising internally efficient mechanisms for conflict resolution and resource allocation. It is deemed possible both to craft new institutions and to 'make good' the deficiencies of indigenous arrangements through careful design (Ostrom 1990, Uphoff 1992, 2000, Bromley and Cernea 1989, Wade 1988).

The practical appeal of this approach has been enormous and we see design principles directly translated into policy and project documents, often as blueprints for action. It should be noted that the translation of 'design principles' into policy and practice is often accompanied by gross over-simplifications and abstractions of the ideas that do not do justice to the nuances of Ostrom's work.

Box 1 – Institutional Design Principles

- There should be clearly defined boundaries of jurisdiction over the resource.
- A clearly defined user group or community should manage the resource.
- Locally appropriate rules must be devised.
- There should be clear identification of rights to resources and rules about them.
- Those involved in resource use take part in decision making about the resources.
- Decision making should take place in public, in arenas to which all resource users have access.
- Accountable monitoring and effective authority structures are required.
- Graduated sanctions should be devised for non-compliance with collective rules. Such sanctions must be applied consistently, rapidly and impersonally.
- Conflict resolution mechanisms should be clear, accessible and rapid.
- The ‘nesting’ of local institutions with other levels of decision-making and governance allows multi-layered management of resources in large and complex systems.

These principles are based on Ostrom’s work, but developed and supported by other authors.

An emerging body of work offers a partial critique of the design principles approach to institutions for collective action, whilst recognising the contribution institutionalists have made in showing the potential for community based management of natural resources (Benjaminsen and Lund 2002, Cleaver Mehta, Leach and Scoones 2001). Broadly, critics focus on the limitations of design principles and the institutionalist approach in not offering a coherent theory of collective action, not explaining the causal processes underlying the design principles, for failing to account for the variability and dynamism of contexts in which the principles must be applied, and poorly explaining socially constructed values that shape people’s collective action (Ruttan 2000). Three areas of criticism can be elaborated; the functionalist assumptions underlying institutional thinking, the evolutionism on which it is based and the over-simplification of the social world and processes within it.

The narrow functionalism underpinning institutionalist ideas gives rise to a number of problems. People are conceived in relation to the institution and resource to be managed as ‘farmers’, ‘irrigators’, ‘fishermen’ and so on, leading to a very partial understanding of their motivations for collective action (Cleaver 2000, 2002, Rocheleau 2001). A functionalist approach also makes rather simplistic assumptions about the links between rules and decision making structures within institutions and the outcomes produced in terms of more effective resource management. Steins (2001) has pointed out that the design principles are almost totally concerned with factors *internal* to the institution being

crafted and therefore cannot account for external influences on collective action. It is therefore possible for them to be applied in abstract and decontextualised ways, without taking account of the messy complexity of different contexts.

Institutional theory is strongly underpinned by evolutionary concepts of the role that crafting plays in the development of institutions from weak to strong. Such a process is often equated with making good the deficiencies of traditional or indigenous institutions by introducing modern principles of transparency, the codification of rules and clarification of relations of authority. The fallacy is to equate institutional viability with fixed and formal structures (Rocheleau 2001) and to present a static view of evolution in which there is such a thing as an ideal institution. Critics suggest that such concepts are based on poor understandings of the ebb and flow of resource use and institutional functioning (Cleaver 2000, Chase Smith 2001, Benjaminsen and Lund 2002), of the socially embedded decision making processes of everyday life, and of the norms and preferred ways of doing things which may not conform to 'modern' managerial concepts of transparency and accountability.

The design principles approach is a victim of its own success. The clear and universalised prescriptions for institutional crafting are attractive to policy makers and practitioners and the need for incorporating flexibility in response to the diversity of contexts in which they may be applied is often forgotten. However, several writers have pointed out that the nature of social life renders such clear principles problematic. Neither communities nor resources consistently exist with clear boundaries, natural resources are not simply commodities but invested with social and symbolic meaning to people (Mosse 1997, Cleaver 2000) whose decisions about them may rarely correspond to external perceptions of efficiency and optimisation. Authority structures and the social norms of resolving competition and conflict over resources are rarely clear and consistent but diverse and contingent, subject to negotiation and messy compromise (Lund 2001).

We can build on these critiques to theoretically reconceptualise institutions, institutional formation and collective decision-making. In doing this we draw on the concept of institutional bricolage (Cleaver 2001, Lund 2001). This is a process which has been defined as 'the patching together of institutional arrangements from the cultural resources available to people in response to changing conditions', based on the logic of dynamic adaptation (Chase Smith 2001: 42). Lund suggests that social institutions, such as property regimes, are not things, they are what people do, and that institutions by their nature are not necessarily robust, solid and enduring but must be continually reproduced or re-enacted to exist. Institutional bricolage encompasses a number of ideas which depart from conventional institutional theory. Institutional formation is conceptualised as a (frequently opaque) socially embedded process rather than a deliberate and transparent managerial activity, institutions are shaped by historic factors, by the power relations which prevail in social life and by world views which incorporate the roles of the human, natural resources and the supernatural. Institutions are shaped by 'bricoleurs', both in deliberative decision-making processes and in the iterations of daily life. These individuals have multiple and complex social identities, fluctuating motivations for collective action and the use of resources, changing priorities over lifecourses and make decisions based on both conscious and unconscious rationalities. Such 'post institutionalist' views provide the conceptual basis for this paper.

2. Design Principles in Policy and Practice: the case of river basin management

The case of river basin management provides a good example of the application of certain aspects of the design principles in practice. The current consensus in the water sector focuses on the river basin as the most appropriate basis for managing water resources (Barrow 1998, Bloch 1999). The approach is based round a number of key ideas, of which three have particular resonance with the design principles:

- water should be managed on the basis of its natural hydrological boundaries (the river basin)
- water resource management processes should be open, transparent, accountable and involve all stakeholders
- water resource management should be integrated across all sectors and at all scales within the basin.

(White 1998, Kaufman 2002, Mance 2002).

The idea that water should be managed on the basis of its “natural” boundaries has a long history, extending back to the great hydraulic civilisations of early times (China, Egypt and the Fertile Crescent), which owed their pre-eminence to irrigation (Newson 1997). In the early part of the twentieth century, river basin management received fresh impetus with the establishment of the Tennessee Valley Authority in 1934, and a focus in India on river basins as the natural unit of planning following independence (the first of these, the Damodar Valley Corporation, was set up in 1948). The emphasis on river basin planning has continue since then and has indeed gathered momentum in recent times, with increasing application of the basic concept in a wide variety of contexts (Cate 1999, Chenoweth 2001, Tortajada 2001).

A particular feature of the current interest is the management of “transboundary” waters, referring to basins which cross international borders (Vilich and Mrady 1998, van der Zaag 1999). The “visibility” of international borders separating distinct legislative and administrative frameworks creates clear problems of the integrated management of water resources within the basin boundaries: these are generally addressed through treaties and agreements at varying levels of formalisation (Kliot 2001). Problems similar in nature but different in scale arise on all river basins and form a key feature of the particular case being discussed in this paper. Even in basins which lie entirely within a single national jurisdiction, there will still arise the need for complex and subtle institutional approaches which take account of the range of stakeholders and systems operating within the basin.

The second key element of river basin management relates to the nature of the institutional arrangements through which public involvement in the process takes place. Borrowing from broader perspectives of participation, democracy and accountability, involvement of stakeholders and citizens is taken as an essential component of effective water resource management, and the means by which this can be achieved are constantly under discussion. Two aspects related to this central aim can be identified, the mechanisms by which stakeholder interests are articulated and presented, and the institutional frameworks which take into account these interests within the overall decision-making process (Mance 2002, Oliver 2001). Here again we see close linkages to the institutional design principles, through their emphasis on the involvement of resource users in decision-making, and the need for transparency and openness in the process.

Along with the concept of managing water on the basis of the natural boundaries of the river basin has developed the notion that water resources management should be holistic and integrated across all sectors (Mance 2002). Indeed these twin ideas have now become so inter-connected as to be sometimes indistinguishable and river basin management and integrated water resources management are often used inter-changeably. This situation was not always so. The impetus for river basin management in the early years of the twentieth century was focussed on a single major water function, for example, power in the case of the Tennessee Valley, or irrigation for the Indian basins. Although it was being argued even in the 1930s that basins were ideal units for comprehensive planning because of their ecological integrity (Saha and Barrow, 1982), it was not really until the latter part of the 20th century that a broader view emerged of the need for holistic planning and management of water and other related natural resources within its natural boundaries, based on the river basin as a drainage unit. Whilst this is now the broadly accepted approach, the challenge to the institutional design principles of achieving integrated management lies in the mechanisms and frameworks which can link varying levels and scales of decision-making and governance.

In this paper we provide further critiques of institutional theory and its reflection in river basin management by drawing on a case in the Usangu basin, Tanzania. This case provides us with a good test of institutional design principles as such prescriptions are commonly applied in such situations. Our research draws on concepts of institutional bricolage to show how the complexity of social relations, the dynamic context of livelihoods in the basin and the fluid nature of institutional evolution renders the design principles of questionable validity. We select key principles to interrogate in the light of the Usangu data, relating to:

- the need for clear boundaries of the resource and the community,
- the nature of monitoring, authority structures and sanctions,
- the need for public fora for decision-making and conflict resolution to which all resource users have access,
- the organisation of institutional arrangements into nested systems from the local to the wider scale.

3. Usangu – a challenging environment

Usangu provides a challenging case for the application of institutional design principles, as it is characterised by intense and diverse pressure on natural resources (particularly water and land) by social, economic and ethnic diversity and by a perceived institutional deficit.

Usangu is an extensive basin in the upper reaches of the Rufiji river (Tanzania's main river) in SW Tanzania, covering an area of about 22,000 km². It is defined in geographical terms by its hydrological boundaries, comprising all the land which drains from the Usangu wetland into the Great Ruaha River, at the downstream end of the catchment. It is diverse in landform and land use, consisting of an upper steeply wooded part with a high rainfall, and then an extensive plain supporting settlements and agriculture in the higher

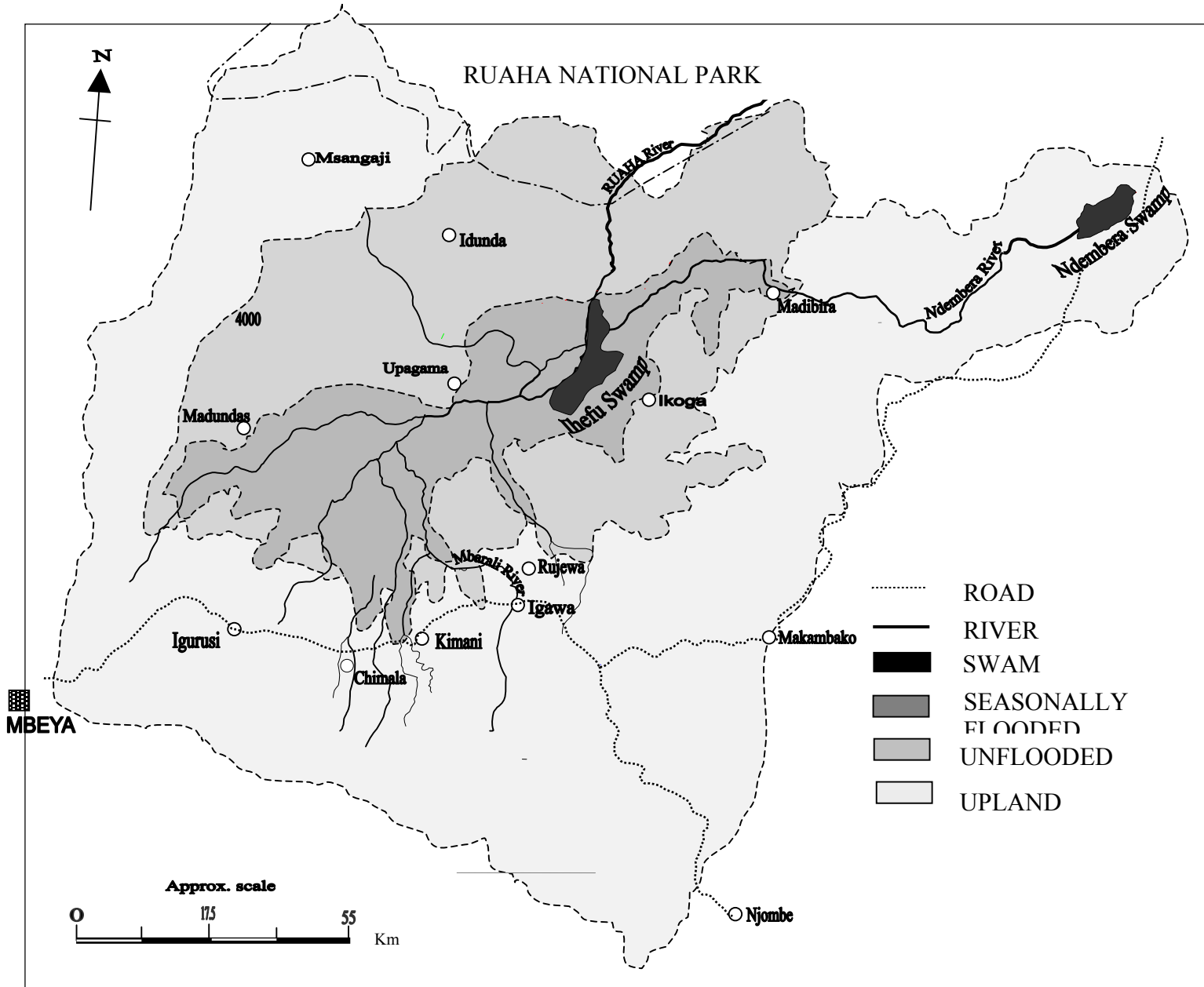
reaches and seasonally flooded grassland in the lower reaches. The wetland comprises both the seasonally flooded grassland and a smaller area of permanent swamp (Map 1).

Around 500 000 people live in the catchment, deriving their livelihoods in a variety of ways mainly from its natural resources. Key occupations include rainfed agriculture and some forestry in the higher regions, irrigated and rainfed agriculture in the upper part of the plain, and pastoralism and a small fishing industry centred on the wetland. The basin is characterised by an increasing demand for resources of all kind. In particular, water resources are becoming increasingly stressed, with the result that the Great Ruaha river downstream of the basin began to dry up during the dry season in the mid 90s, and the period of no-flow is becoming increasingly prolonged. Although this is the most visible manifestation of recent changes, it was quickly realised that it was impossible to look for causes for these changes in the water regime alone, and that it was necessary to study the complex linkages between land, water and other resources to come to a comprehensive view of the basin and appropriate responses to the situation. A project was therefore initiated for the Government of Tanzania, with financial assistance from the UK's DFID. The purpose of this project, the Sustainable Management of the Usangu Wetland and its Catchment (SMUWC) was to develop local capacity to manage the wetland and its catchment sustainably, which was to be achieved through knowledge-generation and capacity-building. Capacity building covered a whole range of initiatives from conventional training programmes for strengthening local government at various levels to the establishment and support of new institutions designed to address particular issues or weaknesses in resource management in the basin. These capacity-building initiatives lead to a variety of institutional issues which provide many of the examples illustrating the points of this article (The project reports can be found at www.usangu.org).

The basin is typical of rural Tanzania in that it is the setting for many development interventions, varying in size from local initiatives affecting a few hundred people, to regional and national programmes operating across the whole basin or in certain parts of it. Many development interventions are based around the existing local government system, focussing on the district, but extending in theory or practice to the village, or its lowest level, the hamlet. Other institutions of importance in the management of water resources are the Rufiji Basin Water Office, which is advised by the Rufiji Basin Water Board. The Water Office has the duty to protect and manage the basin's water resources (which are a national, rather than a district asset), and in particular it has the power to license abstractions and collect water fees.

The population of the catchment is characterised by ethnic diversity and a history of change and uncertainty. Key features have been migration, in particular in-migration of pastoralists from the north in the period 1960 to 1980, and more recently, economic and environmental changes. Population and population growth remains the major driving force, others being economic liberalisation with accompanying changes in agricultural policy, and the remoteness of the basin from Tanzania's main centres of economic activity.

Map 1 The Usangu Catchment



4. Boundaries: clear and closed or overlapping and permeable?

Ostrom suggests that resources should be managed within clearly defined boundaries: the boundaries of the resource and the user community with rights over it would be clearly specified. This is intended to enhance the jurisdictional integrity of collective use arrangements (Ostrom 1990). The principles of river basin management discussed above clearly link to the design principles through the fundamental idea that water is best managed within the natural boundaries formed by drainage lines. The basin provides a natural focus since all the water within it will eventually end up in the single channel (in the case of Usangu, the Great Ruaha River at its downstream end), and moreover the boundaries of the basin are, at least in theory, easy to map and define. Whilst managing water within basin boundaries may seem a logical approach to water planners and other professionals, in practice matters are not so simple.

Complexity in institutional structures operates at many scales and levels. A multiplicity of agencies, institutions and social arrangements exist within Usangu, with responsibilities covering the whole range of resource management responsibilities. Bureaucratic agencies comprise the sectoral ministries and local government, with tiers of responsibility extending from the national level to the district, and, in the case of local government down to village and hamlet. Sectoral responsibilities extend across a wide spectrum, with the ministries responsible for land and water resources of particular importance to the people of Usangu. Responsibility for the management of land is particularly complex, even within the bureaucratic framework, because it is shared between the central Ministry of Lands and Surveys and local government at the village level, following the passing of the Village Land Act in 1999 which specifically devolved powers to the village. Socially-embedded institutions likewise comprise a complex array of institutions operating at the local level and focussing on large range of different activities and responsibilities, from local self-defence militias to choirs.

The number and diversity of these institutions makes it difficult to present a single coherent picture of the multiplicity and complexity of relationships between them. Box 2 gives a partial picture, focussing on the various institutional arrangements which influence the management of irrigation and pastoralism in the basin.

The boundaries of both the resource and the community, and their relationship to these managerial and institutional structures, thus prove elusive to rigid specification. Resource boundaries frequently overlap or overlay administrative boundaries (for example with different villages sharing the same water supply). People may wish to combine the use of water with other resources (such as grazing land) that has different boundaries, and the organisation of people's lives is partly shaped and constructed through multiple cultural and social networks rather than simply through resource or jurisdictional boundaries. So, for example, people may seek to access water resources in an area other than their own community, but where they can secure access through kinship arrangements. Indeed several recent studies show the difficulties of separating out administrative arrangements relating to land and water (Benjaminsen and Lund 2002) and Maganga has shown for Usangu how disputed claims over property and resources can be closely linked to marital and family disputes (Maganga, 2002).

Box 2 – Institutions related to Irrigation and Pastoralism in Usangu

<u>Institution</u>	<u>Irrigation</u>	<u>Pastoralism</u>	<u>Key interest</u>
Water user groups	•	o	Water management. Protecting crops from livestock
Pastoralist groups	o	•	Access to land and water
Meetings of elders	o	o	Resource management and conflict resolution
Traditional groups	o	o	Originating from the Merere chieftainship. Rainmakers, priests and guardians
Work groups	o	o	Maintenance, self-defence etc
Cultural groups	o	o	Masai and other groups, many with an origin in pastoralism
Village councils	o	o	Allocating land resources within the village
District council	o	o	Raising taxes from agriculture and livestock
District livestock development officer	o	•	Supports the development of livestock in the district
District irrigation officer	•		Supports the development of irrigation in the district
District natural resources officer		•	Monitoring grazing, forest and other land resources
Local government at other levels	o	o	Village plans aggregated at ward level. District plans formulated within the framework of the region.
Rufiji basin water office	•		Allocating water resources within the basin. Collecting water fees
Zonal irrigation office	•		Development of irrigation in the basin
Usangu Game Reserve Manager		•	Exclusion of pastoralism from the Usangu Game Reserve
District commissioner	o	o	Mediating resource management at the district level
Magistrate's court	o	o	Adjudicating resource management conflicts
Civil society		o	A variety of NGOs with an interest in the environment, and opposed to pastoralism
The media		o	A continuing interest on water availability and pastoralism in Usangu
Downstream users	•		Water availability downstream of the basin
Legend:			
Major interest	•		
Minor interest	o		

Seasonality of boundaries

The idea of clear boundaries of a resource and a user group cannot adequately account for the seasonality of rural livelihoods and the differing needs for access to resources over the year. Seasonal uncertainty of resource availability may mean that people outside the regular user community seek access to a resource – for example if a water source dries up or breaks down in the dry season people may seek alternative supplies in adjacent village.

Pastoralists use the grazing lands (far from the villages in which they reside) seasonally. They pay taxes and are nominally eligible to participate in public decision making in their ‘home’ villages and yet their use of grass and water and their temporary residence in the grazing lands directly impacts upon resource availability in nearby villages. Officials in adjacent villages tried to deal with this by requiring pastoralists to register their presence locally, but they are reluctant to do this for fear of being taxed twice.

Boundaries and Livelihood networks

People with adequate labour or cash resources may expand their livelihood activities outside their home areas. Examples include the renting of land (including irrigated land) in other villages (often those where they have kin), establishing businesses (such as selling beer or food) in villages where kin reside, undertaking commercial exploitation of natural resources, such as burning wood for charcoal which takes place in forest areas often distant from the home village. Such livelihood diversification makes it very difficult to link a resource user to a particular territorially-related, resource management institution. Odgaard has noted that people in South West Tanzania draw on a variety of institutional channels to legitimise their access to resources, utilising both ‘traditional’ and ‘modern’ institutions to make claims and secure access and rights (Odgaard, 2002).

In cases where land and water interactions are critical, the definition of hydrological boundaries is not necessarily meaningful to local resource users. We can see that where boundaries exist they are permeable and often fluctuating and that they are overlaid with the multiple social networks through which people access resources and manage their livelihoods (Berry 1993 and Peters 1994). Imposing rigid resource management boundaries on these existing structures runs the risk of ignoring the social realities of resource use.

In summary, both the institutional design principles and the river basin management literature would suggest that Usangu’s water resources should be managed on the basis of the river basin, and indeed there is a water agency and board set up to support this. In practice, however, the situation is not that straightforward. Both the existing institutional structures and the livelihood strategies and understandings of the local people are established along different lines, and it is therefore necessary that other approaches and institutional frameworks should evolve.

5. Low cost public decision-making

The design principles literature strongly emphasises the desirability of public, transparent decision making and conflict resolution arrangements at the lowest possible level. Thus, Ostrom suggests it is desirable that:

‘Most individuals affected by the operational rules can participate in modifying the operational rules.’

and that

‘Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials’ (Ostrom 1990:90).

The ‘low cost arenas’ for decision making and conflict resolution are often assumed to be representative user committees or associations, perhaps backed up with more general consultative public meetings of all resource users. However, such an emphasis is based on idealised notions of the homogeneity of the community and the possibilities of participatory processes (Li 1996, Agarwal and Gibson 1999). It little recognises the ways in which power relations are played out in public fora and the possibility of institutions reproducing existing inequitable relations in society. Odgaard (2002) found for a neighbouring area of Tanzania that processes of negotiating access to resources through both ‘traditional’ and ‘modern’ institutions served to gradually exclude marginalized groups of people. Nor does it recognise that there may be social preferences for a convenient opacity in collective arrangements, for non-confrontational and socially supported forms of decision making and conflict resolution (Cousins 1996). These points are elaborated in the following examples:

Access and articulation

Despite the nominal specification of rights to participate in local decision making in Tanzania, social relations and imbalances of power ensure that people with particular social identities may find such participation difficult. Exclusion on the basis of social identity may become more pronounced at times of scarcity, where access to disputed resources becomes critical.

Pastoralists, have very low levels of representation on decision making bodies in Usangu, and probably even lower influence on the decisions made. Pastoralists are often perceived by the politically and numerically dominant agriculturalists to be itinerant (even when they are settled) and therefore ineligible for full participation in decision making. Prejudicial attitudes against pastoralists (who are often perceived as intransigently backward) also militate against their full incorporation into decision making. Examples of their inability to significantly influence local decision making include an occasion when a village council, faced with the alleged problem of the pastoralists’ cattle grazing on the growing crops of agriculturalists, demarcated a grazing area for the cattle far from the village. Despite the nominal membership of pastoralists of the village assembly, their views that the land was unsuitable for cattle were not taken into account.

In Usangu women and children often have little or no direct representation on decision making bodies, despite being the managers in use of many natural resources. Where

women are represented in public decision making they often claim that they go just to listen, and that they don't 'have the words' to articulate their concerns in these fora. Examples of women and children being the users of water resources but being little involved in formalised public decision making about them include their use of irrigation water both for productive and domestic purposes (children, youth and women are prime labourers on paddy fields), but their almost total absence from irrigation committees.

Where women do participate in public decision making about natural resources, their mode of involvement may render them less visible than men. Previous research in Tanzania highlighted gender differentiated preferred norms of participation in public fora, with men preferring individual articulation of interest and opinions, women relying on key representatives to present their views (Cleaver and Kaare, 1998).

Poor people are perhaps the most disadvantaged by public decision making arrangements. The opportunity cost of attending meetings is often too high for labour stressed households who secure their basic needs on a daily basis. They too experience severe problems of articulation in public fora – the most extreme examples being the poor families who don't even speak the common language Swahili, because they have never been to school. Their limited social networks also militate against their ability to influence the decisions made in public fora. Common water management measures (for both irrigation and domestic water) included closing sources periodically, charging for water and requiring labour contributions to maintain water sources. Poor people, often at the tailend of systems, may be unable to secure sufficient irrigation water at times when they have adequate labour to use it. They therefore may rent out their irrigated land and so forfeit the right to take part in decision making about the allocation of water. Their rights can be further eroded by the difficulty they find in contributing to collective labour to clean irrigation furrows. Inability to use land, or neglect of land can result in it being reclaimed and reallocated by village authorities.

Work in Usangu tried to take account of the problems of access and articulation through processes of video mediation. At its simplest, this involves producing a video of groups of resource users discussing their interests and concerns, in relation, for example, to issues such as irrigation and pastoralism. The video is then shown to other stakeholders, whose responses and reactions are then added to the video. This is then shown back to the original groups in a process which can extend in a series of iterations to a wide range of stakeholders. Video mediation can work well because it avoids direct confrontation among user groups, and between user groups and authority. It therefore allows stakeholders to develop their negotiations in a way which stimulates dialogue and understanding of others' positions and promotes access and articulation.

Socially costly conflict resolution

The definition of a 'low-cost' conflict resolution arena is open to question. Institutionalists focus on the need to reduce the transaction costs of collective action, to increase the flow of information available to resource users, to ensure that agreements made are backed up by authority systems and do not have to be constantly renegotiated, that free-riding is suitably punished. Individuals are thought to be more likely to participate in resource management arrangements when the transaction costs to them are reduced.

However, research in Usangu suggests a somewhat different view of the costs and benefits of collective action. People in Usangu demonstrate a deeply held preference for conflict avoidance and for reconciliatory conflict resolution systems (Maganga 2002). The preferred channels for resolving disputes over resource use are *existing* social and cultural structures; only if these fail do people resort to more formalised and transparent conflict resolution. Social forms of conflict resolution (often conducted through village elders) emphasise the generous interpretation of compliance with the rules (a blind eye is turned to a limited amount of free riding), the negotiation of compliance over time, rather than at a single event, and the desire for reconciliatory rather than adversarial solutions (fines and punishments imposed only in the last resort). Moreover, punishment may often safely be left in the hands of gods or the ancestors, so relieving individuals of the troublesome obligation of imposing sanctions on close neighbours, even kin. Such conflict resolution through socially embedded mechanisms is neither rapid nor low cost but people may be willing to incur transaction costs if the outcomes are socially preferable, more reconciliatory and less adversarial, so preserving the possibility of maintaining livelihood interactions with the offender (Cousins 1996).

In crafting new institutions then, we need to ask critical questions about participation in local public decision making, to ascertain the level of inclusiveness and representation involved. Whose views and interest are actually articulated in such fora, which underlying social values reproduced? An understanding of the limits imposed upon participation by livelihood dynamics, particularly the constraining effects of poverty should lead us to be sceptical about easily claiming local representation in institutions and decision making processes.

6. Monitoring, authority and sanctions

The Design Principles literature stresses the importance of effective monitoring of resource use and of compliance with collective rules. Thus Ostrom suggests that:

‘Monitors, who actively audit common pool resource (CPR) conditions and appropriator behaviour, are accountable to the appropriators or are the appropriators’

and

‘Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and the context of the offence) by other appropriators, by officials accountable to these appropriators, or by both.’ (Ostrom 1990:90)

In terms of institutional crafting these principles translate into the need to establish clear monitoring systems based on indicators and transparent processes. Such monitoring systems, as well as providing information about potential depletion and degradation of resources, help to determine where people are cheating or free riding on the collective good. Authority systems built into the institutional structure are then used to exercise prompt and impartial exercise of sanctions, which are seen as critical in determining the effectiveness of collective resource management.

In theory, systems of monitoring, authority and sanctions in Usangu are built up on a standard framework of bureaucratic systems and norms which follow these principles.

Sectoral ministries retain overall responsibility at the national level for land, water and other natural resources. They exercise this responsibility at the local level either directly through their staff seconded to the district tier of local government or in close association with local government in some form of dual responsibility. For example, the Village Land Act devolved the management of land resources to the village level of local government, although the Ministry of Lands and Surveys retains national responsibility for land resources. Water, by contrast, remains a national asset, and the national agencies concerned with water retain a key role and presence in Usangu. The various agencies provide for monitoring of resource availability and use, they have legal powers to impose regulations on resource implementation, and they can sanction those who transgress the regulations through the court system.

Monitoring

In practice, the apparent simplicity of the design principles is not matched by simplicity in application. Firstly, it is difficult to monitor the management of water and other resources in Usangu because of the multiplicity of resources and the way they are linked to one another and utilised. Irrigators, for example, differ from pastoralists in the aspects of water availability which are of interest to them. Irrigators are interested in flows, and the times at which flows above a certain minimum become available to them. They are also concerned to see that those at the head of the system are not taking more than their fair share of water. Pastoralists are interested in availability of water in minimum quantity, in ponds and ditches as much as in canals. Even for irrigation, where canals and field irrigation systems in principle allow for simple monitoring (when gates are opened and closed), in practice very little monitoring is done either by the irrigators themselves, or by the agencies with overall responsibility.

Secondly, in common with other aspects of collective action, monitoring is not a cost free activity for participants and stakeholders. For example, the water agencies in Usangu are ill-equipped to discharge their responsibility for water effectively. The key institution, the Rufiji Basin Water Office, has responsibility for the whole of the Rufiji Basin, covering an area of some 177 000 km². Until recently, it operated out of a single office, and was woefully ill-equipped, in terms of skilled staff and basic resources such as vehicles, to discharge this responsibility. Even though its capacity is gradually improving, it is still difficult to foresee a situation in the near future where the Water Office will be able to actively manage and exercise its legal authority over the water resources of the basin. With dozens of sub-catchments and hundreds of control structures within its jurisdiction, the physical size of the task is just too great, and some other local adaptation must emerge.

Research suggests that where people establish their own arrangements they incorporate monitoring into existing livelihood activities, so ensuring that the effort and the opportunity costs involved are minimal. For example at a new handpump at Ukwaheri village, provided through the SMUWC project and managed by the community, a system of locking the pump was introduced. By opening the pump only at certain hours the committee could ensure that everyone in the community had to take water at roughly the same time so avoiding the necessity of constant monitoring of the pump. Observations made by committee members during pump opening hours (when they or their household members were collecting water) provided the basis for charging households differentially for water use. Such monitoring was informal, integrated into livelihood activities and

uneven in application, as assumptions about a household's water use were sometimes substituted for observation and measurement.

Authority systems

The Design Principles stress the need for “accountable monitoring and effective authority structures”, whilst the river basin management literature likewise stresses the need for appropriate institutional arrangements (Taylor and Wright, 2002). However, the complex nature of livelihoods in Usangu and their relationship to linked systems of natural resources means that it is difficult to identify and define simple authority structures which can take overall responsibility for resource use and management.

Local government has a pivotal role to play, and forms an important point of contact for many local resources users. However, local government is often ill-equipped, in terms of structure and resources, to perform effectively in this role (Larson, 2002). In the case of Usangu, it was noted that village governments had legal responsibility for management of natural resources at the local level but that most members of these governments had no clear idea of these responsibilities and little capacity to discharge them. Many local government officials at the district level are primarily concerned with provision of physical infrastructure (roads, schools and clinics) and the generation of revenue for this district, rather than natural resource management for their areas, and they are in any case often very short of human and financial resources. In addition the lack of alignment of administrative and natural boundaries means that procedures for exercising their authority can become very cumbersome. For example disputes between neighbouring villages over water in Usangu can in theory and in practice require resolution of the problem through the relevant regional centres lying some 200 km apart. In one case two villages were sharing the same watercourse for their domestic needs. When the upstream village began using the water also for irrigation, the downstream village complained through the district water engineer in Mbarali, in Mbeya region. However, the upstream village lay in a different district in Iringa region. Although there was informal contact between the two district water engineers, formal resolution of the matter had to be conducted through the regional centres of Iringa and Mbeya, involving a considerable investment of human and financial resources, and lasting a significant time.

Authority is not simply invested in government structures. In common with other African countries dual legal systems incorporating ‘customary’ and ‘modern’ institutional arrangements, exercise jurisdiction over the use of natural resources. Indeed, the delineation between systems may be blurred with processes of ‘formal informalisation’ and ‘informal formalisation’ taking place through negotiation and institutional bricolage (Benjaminsen and Lund 2002) For example in the case of ward tribunals, the lowest level of ‘modern’ legal jurisdiction, ‘customary’ methods of handling conflicts through deploying reconciliatory principles and established social procedures are combined with modern ones (Maganga 2002). Conventional wisdom suggests that modernisation, and in Usangu, a history of in-migration and ethnic diversity, has eroded traditional authorities (chiefs, headmen, spirit mediums) to the point where they are irrelevant to resource management. We found instead the persistent use *alongside* modern authority structures of traditional elders, healers, guardians of shrines and remnants of the Merere chieftainship, in matters of land allocation, access to land, water and forests, fertility of land, rainfall, personal health, family wellbeing and marital disputes. We found examples of both ‘traditional’ and ‘modern’ authorities at the local level being used to formulate and

exercise 'bye-laws' over the use of thatching grass, grazing areas, drinking water, cattle movements and in the resolution of disputes over resource access, including irrigation water and land. The flexible and negotiated set of such authority structures is illustrated by Sukuma pastoralists, who as in-migrants, often deferred to indigenous Sangu customs and authorities in order to secure access to land and water (Cleaver 2000, SMUWC Rural Livelihoods Report 2001)

The coexistence of different systems of authority, further complicated by the diverse cultural heritage of different ethnic groups in Usangu, leads to a dynamic institutional complexity, and scope for negotiation of rights and access. The outcomes of such dynamic processes are likely to reflect prevailing structures of social inclusion and exclusion. The reproduction of gender inequities through institutional functioning has been noted in Tanzania for both water and land (Adams et al 1997, Odgaard 2002). Both customary and modern institutions, processes of bricolage and of crafting may reproduce such inequalities.

Sanctions

The emphasis in institutional design literature on the role of sanctions in securing compliance with community rules has been questioned for its adversarial emphasis on public confrontation rather than negotiated reconciliation (Cousins 1996, Maganga 2002). It also idealises a form of bureaucratic regulation which may be impossible to implement in the highly socialised context of community based resource management. Recommendations to adopt such bureaucratic approaches to water management are commonly found in the literature which stresses the need for the prompt and depersonalised exercise of sanctions:

“water resources managers should enforce strict compliance with the regulations governing the behaviour of water users and the impacts of water utilisation on the natural environment” (Koudstall et al, 1992)

However, at the local level people are not perceived by others simply as anonymous 'resource appropriators' or users but as very real individuals with a social identity as neighbours and kinsfolk. Evidence from Usangu and elsewhere (Cleaver 2000, 2002, Maseruli 2000, Mnzava 2000, Potkanski and Adams 1998, Adams et al 1997) suggests that the social circumstances of individuals and households count in decisions about imposing sanctions against them for non-compliance with the collective rules. Approximate compliance with rules is usually sufficient to avoid incurring penalties as rigid adherence to punishing all misdemeanours against the common good is considered too costly in terms of time, effort and social capital. The exercise of depersonalised punishments would erode social trust and relations of reciprocity. Where fines are levied as a sanction against anti-social acts, they are often determined according to the ability to pay; household goods such as pots and pans or stools and small livestock being taken as substitutes for cash. Finally when such fines are levied they are frequently used to fund a celebration (a beer drink or feast) the purpose of which is to 'celebrate forgiveness'.

Such a socially embedded system of exercising sanctions tends to reproduce existing social structures and therefore may disadvantage those already marginalized, who are given less room for manoeuvre in terms of adherence to the rules and payment of fines. However,

this disadvantage may be balanced by the positive effect in terms of maintaining social capital and relations of co-operation. For people closely tied to their neighbours in kin through trade, labour exchange, marriage and reciprocal coping strategies, non-confrontational, reconciliatory and processual ways of maintaining compliance with effective rules make sense. We can see the outcome as a compromise between social acceptability and appropriateness and resource management effectiveness.

7. The nesting of institutions: moving from the local to the large-scale

Those working in institutional design, and indeed those concerned with the management of common pool resources generally, have been much exercised with issues of scale. Much of the research work on which current approaches is based has been carried out on small-scale systems where linkages and interactions on the local scale can be investigated and documented. Translating this to the large-scale has been problematic, but has generally been covered in the concept of nested systems or enterprises, in which small local systems covering perhaps a few hundred people form the building blocks which gradually create the larger institution.

Thus the design principles suggest that ‘Appropriation, provision, monitoring, enforcement, conflict resolution and governance activities are organised in multiple layers of nested enterprises’ (Ostrom 1990:90). By this it is envisaged that each layer deals with the same types of issues but at a progressively larger scale and lesser level of detail. Thus, in the case of water management for irrigation, the field level involves a small number of farmers negotiating with one another face-to-face on a daily basis. These field groups are taken up within more formal water user groups, which handle the management of a complete secondary canal, and meet intermittently. In turn the water user groups are nested within a larger body having responsibility for management of water resources for the whole basin. The idea of nested enterprises thus formulated within the design principles is particularly appropriate to the management of a specific CPR such as water. Other schools of thought such as actor-network theory also work with concepts of nested systems (Steins, 2001), though in this case the idea is that the systems (“collectifs”) of resource management (which can comprise both human and non-human entities) are linked to one another through networks of interactions, rather than inside one another as suggested by the design principles.

The concept of nesting is thus used as a mechanism for linking together small-scale local interactions to develop actions on the large scale. In practice, however, nesting institutions for resource management in Usangu faces a range of constraints. Firstly, the physical scale and size of the basin mean that local-level institutions dealing with local issues find it difficult to engage with the issues facing others in the basin who are perhaps over 100 km away, and for whom indeed the key issues may be very different. Thus, water user groups in the upper part of the plain are primarily engaged in allocating water for irrigation and establishing mechanisms for sharing, particularly in times of scarcity, whilst pastoralists are concerned with access to grazing resources and drinking water for their animals. Both are concerned with the issue of water, but in somewhat different ways, and the institutions that evolve in each case do not easily link together within a larger system. Whilst the irrigators can effectively nest within progressively larger scale institutions up to the level of the whole basin, all of which are primarily concerned with water management for crop production, pastoralists’ associations do not form a natural hierarchy in the same way, nor

do they have obvious mechanisms for relating to other resource user groups such as the irrigators.

Scale indeed leads to general problems of “access”, in both physical and conceptual terms. Actors in one part of a resource system such as Usangu may be physically unable to reach other parts of the system in order to interact with it, and this may lead to problems of conceptualising other components and linkages within the system. The final downstream user of Usangu’s water is the main hydro-electric system in Tanzania, but many of the local people living within the basin have no conception of what a hydro-electric dam looks like, or how it functions.

Problems of scale and access lead to problems of inclusion – how to take account of the needs of “others”. In the case of Usangu, this particularly relates to downstream users outside the basin. The importance of water for the hydro-electric system has already been mentioned, but there is also a National Park taking water from the Great Ruaha river immediately downstream of the wetland. Mechanisms for including the needs of the dam and the park within the overall institutions for allocating Usangu’s water do not naturally arise from the idea of “nesting” institutions which arise from a set of broadly-similar circumstances and thus lock into one another. Indeed, even within the basin, problems arise because of its diversity. Experience in one of the sub-catchments in trying to bring together the various resource user groups (domestic water, irrigation water, pastoralist groups) alongside the local government structure and other existing local institutions met with only limited success (Forrester, 2001). In this case, it was envisaged that these various institutions would “nest” inside an “apex body” which would provide an overarching resource management institution for the sub-catchment. Initially, local people were not convinced of the need for the apex body, seeing it as simply one more institution which would require support and contributions from them, and whose function and value was by no means clear (Forrester, 2001). In due course some progress was made in the formation of the apex body, including its formal recognition within the legal system. However, this progress owed much to continuing support from the Rufiji Basin Water Office who saw in it a significant aid to water management at the basin level.

Thus the need remains both in Usangu and in other basins of balancing local level concerns of water managers with those at the large-scale (for example, an overall shortage of water in the basin, and the needs of downstream users). However this is done, it must also take into account the bricolage of local institutions, and the preference of people for locally adapted forms of negotiation and conflict-resolution, and provide mechanisms for these institutions to have their voice in the wider arena.

8. The challenges facing Usangu

The theoretical basis for our discussion has been the institutional design principles as put forward by Ostrom and others, and their application within the context of river basin management. We have focussed our discussion on four of these principles in particular, the management of the resource within clear-defined boundaries, low-cost public decision-making, the establishment of transparent governance systems of monitoring, authority and sanctions, and the nesting of institutions from the local to the large-scale.

In each case we have shown that the challenges facing the application of the design principles to the resource management issues in Usangu are linked through constraints such as scale, diversity and complexity. The response by the SMUWC project was focused on the twin aims of developing knowledge and building capacity amongst the stakeholders, as the basis of a long-term process of negotiating and implementing a sustainable management plan for the whole catchment.

Developing knowledge is a valid response, as a basis for increasing communication and understanding amongst all the stakeholders. There is good evidence that earlier attempts to develop acceptable strategies for resource management in Usangu had been based on erroneous or incomplete analysis of the situation and that this had in fact led to counter-productive actions by various stakeholders, particularly in relation to the role of pastoralism. The importance of the process of developing and using knowledge, and of balancing perceptions held by different stakeholders has been the subject of significant discussion, (for example, Dwivedi 2001) and this continues to be a point of interest and significance in the evolving situation in Usangu. The initial stage of knowledge generation in the basin during the SMUWC project relied heavily on inputs of expatriate specialists, covering a very wide range of disciplines. Whilst this was effective in developing a sound baseline of knowledge, it has been criticised for being very costly and for producing outputs which were not easily accessible to the basin's stakeholders. Although there was some justification in using outsiders in order to secure a disinterested understanding of the systems in the basin, efforts have subsequently focussed on making this more accessible and intelligible to local people.

Of more direct relevance to the application of the institutional design principles is the second aim of the SMUWC intervention, capacity-building. This was included as an initial objective of the project but did not commence until it was decided whose capacity was being developed and for what purpose. As the process unfolded, it became clear that these issues would not be easily resolved, and that the evolution of institutions for managing the resources in Usangu would itself be a long and complex process, and that capacity-building of these institutions would necessarily have to be slow and gradual in response. The capacity-building initiatives in SMUWC therefore took a variety of forms. On the one hand, they included the formal training of bureaucratic institutions. At an early stage the lack of capacity of village governments to discharge their formal responsibilities was recognised as a constraint, and the project initiated and supported an extensive formal programme of village government training to address this. Opportunities were also taken as they arose to provide support for informal institutions. For example, water allocation and management in the basin is the formal responsibility of the Rufiji Basin Water Office, which is advised by a Water Board. In practice, however, there was no forum in which water managers could meet informally to discuss important issues such as the management of scarce dry season water. The project established such a forum, and supported its subsequent informal development. When the project ended, this support was taken over by the Water Office, and the water managers' group extended and developed through a form of bricolage as additional water users and stakeholders joined its activities.

At the present time there is still uncertainty about what institution or institutions will evolve as the most appropriate for managing the natural resources of the Usangu catchment. It does, however, seem clear that simple notions of "river basin organisations" based on institutional design principles will not be appropriate for the time being and that the future response will be some form of *bricolage* of existing and evolving institutions

linked together in complex and fluid networks, in which institutional design principles are only partly applicable. Support and capacity-building of the institutions that do emerge is likely to be a complex, lengthy and sensitive undertaking.

References

Adams, W.M., E.E.Watson , S.K.Mutiso, (1997) Water Rules and Gender: Water Rights in an Indigenous System, Marakwet, Kenya, *Development and Change*, vol 28, p707-730.

Agarwal A and C C Gibson (1999) 'Enchantment and disenchantment: The role of community in natural resource management' *World Development* , Vol. 27, No. 4: 629 – 49.

Asian Development Bank (1996) *Towards Effective Water Policy in the Asian and Pacific Region*. Asian development Bank, the Philippines.

Barrow, C. (1998) River basin development planning and management: a critical review. *World Development* **26(1)**, 171-186.

Benjaminsen T and Lund C (eds)(2002), *Securing Land Rights in Africa*, the European Journal of Development Research, Vol.14, Number2, December.

Berry, S. (1993) *No Condition is Permanent: the social dynamics of Agrarian Change in Sub-Saharan Africa*, University of Wisconsin Press, London.

Bromley, D. W. and M. M. Cernea, 1989, The Management of Common Property Natural Resources, Some Conceptual and Operational Fallacies, World Bank Discussion Papers No. 57, The World Bank, Washington DC.

Cleaver, F. (2000) 'Moral Ecological Rationality, Institutions and the Management of Common Property Resources', Development and Change, Vol.31, No 2, March, pp 361-383.

Cleaver, F.D. (2001) Institutional bricolage, conflict and co-operation in Usangu, Tanzania. *IDS Bulletin* **32(4)**, 26-35

Cleaver F. (2002) Reinventing institutions and the social embeddedness of natural resource management' , *European Journal of Development Research* Vol 14, No 2, December.

Cousins B (1996) ' Conflict Management for Multiple Resource Users in Pastoralist and Agro-Pastoralist Contexts', *IDS Bulletin*, Vol27, No3, pp41-54.

Dwivedi R (2001) Environmental Movements in the Global South: Issues of Livelihood and Beyond. *International Sociology* Vol 16 no. 1 pp 11-31

Forrester K (2001) Evaluation of the Sub-Catchment Resource Management Plan SMUWC Project mimeo

Koudstall R, Rijsberman F.R and Savenjie H (1992) Water and Sustainable Development. Natural Resources Forum Vol 16 no. 4 pp277-290

Larson, A. M. (2002) Natural resources and decentralization in Nicaragua: are local governments up to the job? *World Development* **30(1)**, 17 – 31

Li, T.M., (1996) 'Images of Community: Discourse and Strategy in Property Relations', *Development and Change*, Vol27, 501-527.

Lund C (2001) 'Seeking certainty and aggravating ambiguity: On Property, Paper and Authority in Niger, IDS Bulletin Vol 32, October, pp 47-53.

Maganga, F. (1999) Resource Conflicts and Conflict Management: fieldwork findings from Iringa and Mbarali District, SASA, Copenhagen

Minzava, D. (2000) How modern water resources management conflicts with traditional/indigenous management; the case of Arusha Water Project, Unpublished paper, University of Bradford, June.

Maseruli, B. (2000) Local Institutions and the Management of Natural Resources, Unpublished Field Notes, College of African Wildlife Management, Mweka, Tanzania

Mehta L. Leach M and Scoones I (eds)(2001) Environmental Governance in an Uncertain World , IDS Bulletin Vol.32, No4, October.

Newson. M (1997) Land Water and Development. Routledge, London

Odgaard R (2002) Scrambling for Land in Tanzania: Processes of Formalisation and Legitimation of Land Rights, *European Journal of Development Research*, vol 14, No 2, December pp71-88.

Ostrom, E. (1990) Governing the Commons: The Evolution of Institutions for Collective Action, Cambridge University Press, New York

Ostrom, E. (1992) Crafting Institutions for Self Governing Irrigation Systems, San Francisco, ICS Press

Peters, P. (1994) Dividing the Commons: Politics, Policy and Culture in Botswana, London, the University Press of Virginia

Potskanski T and W.B. Adams, (1998) Water scarcity, property regimes and irrigation management in Sonjo, Tanzania, *The Journal of Development Studies*, vol 34, No4 pp86-116.

Rocheleau D (2001) Complex Uncertainties and Relational Webs: Uncertainty, Surprise and Transformation in Machakos, IDS Bulletin Vol32, No4, pp 78-87.

Ruttan, L. (2000) 'Games and the CPR toolkit' *The Common Property Resource Digest*, no 55, pp 1-3

Saha S.K and Barrow C.J (1982) *River Basin Planning: Theory and Practice*. John Wiley and Sons. Chichester

Scoones, I. (1998) Sustainable Rural Livelihoods, A Framework for analysis' IDS Working Paper No. 72, IDS, Brighton

Serageldin I (1995) Water Resources Management: A New Policy for a Sustainable Future *Water Resources Development* Vol 11 no. 3 pp221-231

SMUWC, 20001d, SMUWC Final Report: Conflicts,
<http://www.usangu.org/reports/conflicts.pdf>

Steins, N. A. (2001) New directions in natural resource management: the offer of actor-network theory. *IDS Bulletin* **32(4)**, 18 – 25

Thompson, J. (1995) Participatory approaches in government bureaucracies: facilitating the process of institutional change. *World Development* **23(9)**, 1521 – 1554

Uphoff, N. and Wijayaratna, C. (2000) Demonstrated benefits from social capital: the productivity of farmer organisations in Gal Oya, Sri Lanka. *World Development* **28(11)**, 1875 – 1890

Wade, R. (1988) Village Republics: Economic Conditions for Collective Action in South India, Cambridge, Cambridge University Press

World Bank (1993). W Resources Management. World Bank, Washington