



Fostering Institutional Creativity at Multiple Levels: Towards Facilitated Institutional *Bricolage*

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ABSTRACT: Problems occur when institutional arrangements for collective management of food and water systems fail to meet demands. Many of the problems characterising river basins and other collectively managed water resource systems can be ascribed largely to the failure of institutions to enable problems beyond the individual to be managed collectively. The nature of these demands, and the institutional responses to them, vary widely and are not amenable to simple definitions and prescriptions. We begin with a brief review of conventional approaches to analysing institutions and organisations, focused largely, but not exclusively, on river basins. We observe that attempts to reduce the institutional landscape of river basins to over-simplistic formulas introduces more problems than solutions, because the reality is that institutions evolve through complex creative processes that adopt and adapt diverse ingredients – rather like making a stew. Despite such intricacies, institutions are clearly non-random, so we continue a search for a means of describing them. We adopt the concept of *bricolage*, as proposed by Cleaver and others, and use it to show the value of promoting and facilitating an organic creative approach to building and strengthening river basin and other water management institutions.

KEYWORDS: Institutional *bricolage*, institutional change, institutional economics, river basin organisations, social change processes, collective action

Asoka won the Battle of Kalinga. Wellington won the Battle of Waterloo. This is what we learn. But battles are not won by kings and generals. They are the complex outcome of the individual actions of thousands of unremembered soldiers.¹

SOCIAL BEHAVIOUR IN RIVER BASINS: INSTITUTIONS AND ORGANISATIONS

Need for science to understand the roots of social behaviour

This paper examines institutional aspects of water, food and poverty in the context of developing-country river basins. There are now numerous studies demonstrating the wealth of insights into, and understandings of, the water and food nexus that can be achieved through detailed integrated interdisciplinary research in river basins; recent examples are the products of the Basin Focal Project (BFP) of the CPWF (Woolley et al., 2009; and papers in special issues of *Water International* 35(5) [2010]; 36(2) [2011]). Detailed studies in multiple river basins have elucidated many serious problems and issues: high and often growing levels of poverty and deprivation compounded by rising social and economic inequity and increasing stresses on land and water, exacerbated by global processes such as climate change and rapid transformations in international trade regimes. Food insecurity characterises

¹ Sinha, *The Death of Mr Love*, 2003.

large numbers of people in nearly all Asian and African river basins; and lack of access to, or low productivity of, water is one of the central factors underlying poverty and food insecurity. In many cases, research has identified that there are, in principle, clear opportunities for reversing these processes, interventions that, if implemented well and on a sufficiently large scale, would lead to improvements in productivity, equity, incomes and well-being.

Institutional issues are central to understanding the challenges being faced and to finding and implementing solutions. The linkages among water, food and poverty, whether through lack of access to water, exposure to water hazards or disasters such as droughts and floods, or inadequate livelihood development, are in all cases mediated through social and institutional factors. The availability of water, and peoples' access or lack of access to it, are ultimately a function of the effectiveness of policies and institutions. The productivity of water is a function of institutional incentives and support systems: without positive incentives and support, new technologies and practices will not be adopted and used effectively. The resilience of people to shocks and capacity to adapt to the impacts of climate variability and change can also be understood as a function of the strengths and weaknesses of institutional arrangements, a term that includes the degree of structural inequity. The challenge is to find effective means to collectively manage shared natural resources in a way that optimises the benefits to people, is perceived as fair and equitable by the participants, and sustains the resource so that its benefit streams are available to future generations. This is a fundamental problem facing human beings. It occurs at all scales, from small local communities managing water, grazing land, or forests, to large-scale irrigation schemes or forest reserves, to river basins including large transnational ones, up to global levels: managing ocean fisheries or the atmosphere of the earth itself to mitigate climate change.

Social science cannot provide a unifying theory

Given the central importance of institutional and social factors, and the necessity of collective management of multiple vital resources, it is unfortunate that the social and institutional sciences are incapable of offering easy solutions. There are no universal models or panaceas that can be applied or adapted to solve institutional problems (Merrey et al., 2007; Mollinga et al., 2007). While disciplines such as hydrology, agronomy, and soil science are grounded in well-understood universal principles that can be used to analyse specific situations and identify technically valid solutions to problems, there is no agreement among social scientists with regard to the 'laws' of human behaviour. Some economists may claim their discipline is an exception, but they are deceiving themselves: economic analysis leads to important insights, especially in market-based economies, but only on the basis of multiple caveats ('other things being equal', 'assuming perfect information', ...) and contested assumptions (of people rationally calculating options to maximise returns, for example). The social sciences are split among disciplines with entirely different paradigms, and within each discipline there are also highly contested theoretical differences which are difficult to resolve. Many social scientists aspire to the perceived rigour and scientific respectability of the physical and natural sciences, but this has been achieved only in science fiction.² Those of us purporting to contribute to the understanding of complex systems must be modest about what we social scientists can provide – and even more so when we try to recommend intervention or reform strategies and pathways.

However, being modest about our science should not deter us from offering insights and approaches to analysing the institutional components of complex systems, with the goal of identifying opportunities and strategies for intervention. In most developing-country basins, the likely developmental trajectories in the absence of purposeful interventions are alarming. The wrong interventions can make a bad situation worse. Single-dimensional interventions, for example introducing a new technology, or new laws and organisational designs (institutions) by themselves are unlikely to be adequate in addressing

² Most notably Hari Seldon, who creates 'psychohistory' as a scientific discipline that predicts the future of human civilisation. Hari is the creation of the great science fiction writer, Isaac Asimov, and his psychohistory theory drives the series of books on 'The Foundation'. See Asimov's *Prelude to Foundation*, 1988.

problems whose roots are poorly understood and intertwined with others: if they are not marginalised or rejected, they may well lead to unintended consequences and outcomes worse than the proximate problem. Therefore, we do not attempt a grand theoretical model of how institutions work and how to make use of them to implement change – in fact one of our main arguments relates to the limitations of designing or crafting institutions as instruments of change. Further, we do not offer a comprehensive framework for comparison of institutions and their effectiveness among basins – that would be an interesting but largely academic challenge. Rather, we offer what may be more useful: firstly, clarification of what institutions are and what they do within basins; secondly, a reflection on a social engineering approach, and why it is unhelpful; and thirdly, we support an alternative approach based on the concept of *bricolage*, leading to conclusions about the differences between these approaches and what seems likely to work under the circumstances within basins.

INSTITUTIONS AND ORGANISATIONS: THE BUILDING BLOCKS

Rules and norms

Humans are a social species, and societies are by definition organised and governed by rules and norms that influence and channel behaviour, in terms of which behaviour of others is understood. All human societies have 'organisations' and 'institutions'. These two terms are often used loosely and interchangeably, since they overlap. In this article, the term *organisation* is used to refer to groups of people with shared goals and some level of formalised patterns of interaction defined in terms of 'roles' (Merrey et al., 2007: Box 5.1). (Organisations are sometimes defined as "structures of recognized and accepted roles" [Uphoff, 1986], a definition focused on the roles and not the people playing roles). Examples of roles are 'husband', 'citizen', 'farmer', 'president', 'neighbour', and the like. Individuals play a multiplicity of roles; which role is appropriate varies with the social context. Indeed, actual behaviour usually reflects several of the roles of any given individual: the president of a country may also be a husband or wife, mother or father, friend, and lawyer. Examples of organisations are water user associations, banks, government irrigation agencies, river basin organisations, consultancy firms, unions, nongovernment organisations (NGOs), and so on. Clearly, organisations vary immensely in terms of their form, size, scope, structure, permanency and purpose. Contrast a vast government bureaucracy with an informal water user association – both are organisations.

'Institution' refers to social arrangements – rules, norms – that shape and regulate behaviour and persist, i.e. have some degree of permanence and purpose that transcend individual lives and intentions. Institutional economists refer to institutions as "the rules of the game in society" (North, 1990; Ostrom, 1990, 1992).³ Rules are interpreted and acted upon differently by different people; they are therefore dynamic and emerge, evolve and disappear over time through usage, negotiation, violation, or lack of use. Examples of institutions include property rights, market mechanisms, marriage, kinship, and agreed rotation schedules for water distribution. Institutions embody 'values', i.e. the degree to which people internalise and rank or value rules: consider, for example, the highly emotive debates over the proper definition of the institution of 'marriage'. As the rules of the game, institutions provide a basis for predicting and judging others' behaviour because they specify, to varying degrees, what is permissible and what is not in given circumstances. They therefore both enable and constrain behaviour. For example, institutions like property rights and contract law make it possible for people to transact business, such as purchasing property. The fact that rights to water can be privately held in some countries, leading to water markets and sales between farmers and urban water authorities, while in other countries water rights are inseparable from land rights or are owned by government, is an institutional difference with profound consequences for management of water. Institutions

³ Sociologists and political scientists often use the term 'institution' more broadly to include patterns of behaviour as well as rules and norms, but this is too imprecise.

therefore are constraints – establishing limitations and boundaries – but also incentives and enabling structures providing the basis for 'doing business', or for promoting innovations.

Institutions provide the rules and norms that people use to form organisations, enabling them to cooperate with one another, coordinate their activities, and mobilise resources to do things that individuals alone could never accomplish. Organisations are therefore the concrete means for getting things done collectively, enabling societies to grow and develop. In some instances, the process of negotiating agreement on new institutional arrangements is based on different parties seeking mutual benefits; but in other cases, where deeply held values are involved or the parties fear they will lose something valuable, the process can be highly contested. This point is related as well to differential power relationships among individuals or organisations that shape the outcomes of negotiations. Institutions are also to a large but variable degree 'path dependent': past history, culture and experiences tend to shape perceptions of what kinds of innovations are appropriate and realistic. For example, Heinmiller (2009) demonstrates how early water apportionment institutions have shaped subsequent attempts at collective action aimed at conservation of water in three river basins (Colorado, Murray-Darling and Saskatchewan-Nelson in the USA, Australia and Canada, respectively).

The example of institutions in river basins

To date, river basin researchers have contributed greatly to the understanding of basin hydrology and agricultural water productivity, but less to understanding the institutional and organisational context. Indeed, this is a generic problem facing the science of river basin management. Most research on river basin institutions has consisted of case studies or limited comparative analyses of specific processes, for example democratisation (e.g. Wester et al., 2003; Waalewijn et al., 2005; Enserink et al., 2007; Sneddon and Fox, 2008). Molle et al. (2007; 2010) offer useful generalisations about river basin development and institutional issues based on a wide-ranging survey of experiences, but do not attempt a systematic comparative institutional analysis. Similarly, as editors of a recent book of case studies, Molle and Wester (2009) attempt to draw out common threads from a set of case studies on river basin development trajectories, but the case studies were largely prepared independently, not on the basis of a shared analytical framework.

Svendsen et al. (2005) analyse river basin governance and institutional options based on a framework of "essential functions for river basin management" combined with a matrix of stakeholders and water use sectors. Based on a hypothesis that there is a minimum set of critical functions that must be fulfilled for effective river basin management, they describe a framework and how it can be used; and also attempt to distinguish two basic organisational patterns of basin governance: *centralised* ('unicentric'), i.e. a single authority in charge of development and management of river basins; and *decentralised* ('polycentric'), i.e. multiple organisations involved in river basin management with some kind of coordinating mechanism among them.

A number of different institutional themes emerge as important in any given context from the available literature (see for example the case studies in *Water International* 35(5), 2010). A few themes are common: the need for transboundary river basin institutional arrangements where upstream-downstream relations among riparian states are critical; conflict between organisations managing different activities that are juxtaposed within the basin; the need for institutional support in the poorest basins to build livelihood systems and reduce vulnerability; the need for resource and benefit-sharing mechanisms that recognise traditional functions while introducing more modern ones, and the emerging opportunity for sharing ecosystem services.

An important characteristic of river basin institutional arrangements – and indeed a common generic problem – is the disconnect between the government ministries and agencies responsible for agriculture and food security, and those in charge of water management. Agricultural water is often an orphan, a subject falling under several agencies with no clear demarcation. At the political level, agricultural ministries are often more focused on the pricing of inputs and outputs and broad policies,

with at best a small unit devoted to local-level water management. Ministries in charge of water affairs give the highest priority to domestic water and sanitation services, and major storage infrastructure (with, again, irrigation often excluded or given low priority). On transnational river basins, agricultural water is often given lower priority than controlling pollution or floods. Agricultural agencies may take an interest in promoting 'green' water – local-level management of rainwater for crop production, while water agencies ignore green water and focus on 'blue', i.e. surface water. Taking an integrated approach to river basin management is therefore rarely achieved, given the fragmentation of responsibilities at multiple levels of governments.⁴

In summary, there is an urgent need to do more systematic research on the institutional and organisational landscapes of river basins, using analytical frameworks that would enable useful comparative analysis while avoiding attempts to squeeze very complex and diverse landscapes into straightjackets.

Designing institutions: The myth of social engineering

Social scientists, like other scientists, seek to identify universally applicable 'laws' based on well-developed theories about the nature of human social systems. Based on this work, social scientists have attempted to identify basic rules and 'design principles' that are seen as universal and provide a basis for designing, 'crafting', and even 'engineering' institutions. This idea that there is a limited set of principles in terms of which humans design or craft new institutions has a long intellectual history. It is epitomised in the work of Professor Elinor Ostrom, co-winner of the 2009 Nobel Prize in Economics, but has also been developed and applied by many others (e.g. Uphoff, 1986; Hunt, 1990; Tang, 1992; Merrey, 1996; Vermillion and Sagardoy, 1999; Meinzen-Dick, 2007). These ideas have been developed through rigorous analyses of literally hundreds of cases of collective management of natural resources, for example fisheries, forests and irrigation schemes. Box 1 provides a summary of some of the institutional design principles emerging from this work. These principles reflect a strong value in favour of democracy, clear specification of rules including sanctions for those who violate the rules, and transparency – values that many of us share with little or no critical examination, possibly explaining the popularity of this optimism about designing institutions; but they are neither strictly necessary nor sufficient for effective organisations.

Another common source of design principles is the growing body of international water law which provides design principles for negotiating treaties and designing the institutional rules governing transnational river basins. International water law and treaties constitute a classical top-down discipline dominated by legal scholars and diplomats. The United Nations Convention on the Law of Non-Navigational Uses of International Watercourses, though adopted by the General Assembly in 1997, has never come into force because it is not ratified by the minimum number of countries required. Nevertheless its principles do underlay most international agreements governing shared rivers. Five main 'building blocks or pillars' – design principles – for international water management have been proposed by Boisson de Chazournes (2003):

1. Water-sharing principles, including 'equitable and reasonable use' and 'no harm' rules.
2. General obligation of riparians to cooperate, including collection and exchange of data, notification of planned uses, and establishing joint mechanisms for cooperation.
3. Protection of the environment.
4. Promotion of dispute settlement and avoidance mechanisms.
5. Involvement of non-state actors (the least developed pillar).

⁴ See Cohen and Davidson, 2011 for a useful recent discussion of the problems arising from using river basins or watersheds as a management framework.

Box 1. Examples of 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 their use.
- ♦ Those involved in resource use should participate in decision-making about the resource.
- ♦ Decisions should be taken in public.
- ♦ Accountable monitoring and effective authority structures are necessary.
- ♦ Graduated sanctions should be devised and applied consistently, rapidly and impersonally.
- ♦ Conflict resolution mechanisms should be clear, accessible and rapid.

- ♦ 'Nesting' of other institutions with other levels of decision-making and governance allows for multi-layered management of resources in large and complex systems.

Adapted from Cleaver and Franks, 2005 (Box 1); see also Ostrom, 1992, 2006.

The notion that water must always be governed based on principles of integrated water resources management (IWRM), which include many of the principles given in box 1, and that river basins form the natural unit for IWRM have become so widely accepted that entire networks and programmes (e.g. Global Water Partnership, Cap-Net) are working to implement these as universal principles. They have only recently been questioned (e.g. by Allan, 2003; Biswas, 2004; Shah and van Koppen, 2006; Molle, 2008; Medema et al., 2008; Merrey, 2008; Warner et al., 2008; Cohen and Davidson, 2011). Warner et al. (2008) remind us that river basin boundaries and management organisations based on these boundaries are not natural phenomena, but political and therefore matters of choice and contestation. Re-conceiving river basins as political units enables critical questions to be raised about their governance: who will make what decisions, and how? In basins characterised by diverse and conflicting social groups grappling with rising pressure on water resources, a single organisation operating based on exogenous institutional principles is not likely to be optimal (Molle et al., 2007; 2010; Molle, 2009). As Warner et al. (2008) put it, "[a] locally rooted diversity, where institutional beasts fit their habitats of geophysical, political and cultural realities, seems preferable". There is a growing body of literature demonstrating the limitations of transferring 'successful' models of governance (for example, the Tennessee Valley Authority or the Murray Darling Basin Commission) to entirely new contexts: it is not that lessons cannot be learned through the comparative study of river basin governance; rather, the development of effective institutions and policies is a negotiated process involving civil society and the state (Shah et al., 2005; Hirsch, 2006; Molle et al., 2007; 2010; Molle, 2009; Merrey, 2009).

The adherence to a social engineering perspective is perhaps best illustrated by more than three decades of efforts to create water user associations (WUAs) and transfer management responsibilities to these new entities ('irrigation management transfer', IMT). Strongly supported by international financing agencies since the 1980s, this reform movement has been promoted in a large number of developing, developed and 'transitional' countries and is seen as a critical reform needed to reduce governments' financial burden while, hopefully, promoting better irrigation performance. In 1999, FAO published a detailed set of guidelines for promoting IMT reforms, which includes advice on how to structure WUA governance (Vermillion and Sagardoy, 1999). More recently, FAO has published a follow-up report documenting worldwide experiences with IMT (Garces-Restrepo et al., 2007). Based on many case studies, this report confirms that by far the most important motivation for IMT has been to reduce governments' financial burdens by transferring them to farmers, and confirms that the results have usually been 'partial' or 'mixed'. A major reason is said to be that funding agencies (not

local champions) have promoted IMT following "fixed institutional arrangements and implementation schedules" and advocates a more flexible approach (ibid). The report argues for 'corrections' such as better monitoring and evaluation to overcome the problems, rather than a more fundamental rethink. Many of the early proponents of WUAs (e.g. Norman Uphoff, David and Frances Korten; see e.g. Uphoff, 1986) had advocated empowering farmers to follow a creative *bricolage*-type process to develop their own collective action arrangements, and promoting similar processes to reform government irrigation agencies. However, this soon morphed into attempts to impose specific institutional designs ('constitutions and bye-laws') and tasks on farmers whose benefits did not necessarily accrue to them. The result, more often than not, as documented by FAO itself, has been irrigation schemes that continue to be poorly maintained and under-perform compared to governments', donors' and farmers' expectations.

Clearly, there are examples of success (in terms of acknowledged activities) in designing institutions, at all levels, from local to international. The Nile Basin Initiative and the Mekong River Commission are examples of river basin organisations that are often cited as operational and effective to some degree. There are numerous purposefully designed organisations at local, district and national levels that are functioning, some rather well; examples include forms of local government and some water user associations. Nevertheless, as Merrey et al. (2007) note, "[t]he record in designing and promoting policy and institutional reforms [in the irrigation sector] is universally bad". There is an assumption among many people that organisations can be designed based on blueprints. 'Social engineering', the idea that one can replicate in a new context an organisational structure or institution that may have worked elsewhere, is based on a fundamental misunderstanding of the "complex, nondeterministic, and stochastic nature of social organizations" (ibid).

This instrumentalist approach to designing institutions for specific purposes assumes that individual actors are "political and social entrepreneurs who rationally utilize social capital to craft institutions in pursuit of optimal resource management" (Cleaver, 2002). In other words, while the design principles identified by institutional economists and others may well characterise many successful collective management institutions, they provide little guidance on how to encourage and foster their emergence and effectiveness. Recent literature, drawing on other social science paradigms, has raised important questions and identified serious limitations of applying abstract principles to complex and dynamic social contexts. It is not that facilitating and guiding institutional change is impossible, but one must be cautious and strategic, and avoid oversimplification. This is the topic of the next section.

INSTITUTIONS AS 'BRICOLAGE': IMPLICATIONS FOR PROMOTING INNOVATIONS IN WATER MANAGEMENT

Creative human agency meets structural constraints

An alternative perspective for conceptualising institutions has its roots in a behavioural perspective derived from social anthropology, interpretive sociology, and social psychology. This paper is not the place to expound on these complex origins.⁵ This section therefore draws heavily on recent work related to water management, especially of Frances Cleaver and her colleagues (Cleaver, 2001, 2002, 2005; Cleaver and Franks, 2005; Cleaver et al., 2005; Franks and Cleaver, 2007) as well as the work and experience of the first author (especially Merrey, 1982, 2009). Like institutional economics, purposeful individual action and interactions with others is considered to be the central creative social process. But institutional economics oversimplifies human agency as essentially a rational and conscious pursuit of economic gain. In contrast, interpretive sociology takes a highly nuanced approach to agency: individuals are seen as both conscious and unconscious social agents, embedded in their social milieu with all its values, norms, and unstated assumptions, perceptions and concepts, but capable of

⁵ See references in Cleaver, 2002, for some of the intellectual roots of this perspective.

analysing and acting upon the circumstances they confront. In other words, as Cleaver (2002) puts it, "individual action is characterized by agency and structural constraint". Cleaver (ibid) therefore uses the term 'institutional bricolage'⁶ as a way of conceptualising how mechanisms for collective action and resource management are borrowed or reconstructed from multiple existing sources; i.e. from existing institutions, styles of thinking, social identities and social relationships. Social identity is critical: all individuals have multiple roles and therefore identities (e.g. as woman, man, husband, wife, daughter, son, friend, chief, social scientist, farmer), a characteristic of human agents that is missing in most institutional theory. These multiple identities reflect multiple and often inconsistent motivations; identities and therefore motivations and perspectives are dynamic and may change dramatically over a lifetime. This perspective replaces the idea of rational 'institutional engineers' with a perspective on individual change agents as 'do-it-yourself bricoleurs' (Cleaver, 2002).

Institutional *bricolage* is an active, conscious creative process of adapting norms, values and social arrangements to fit new purposes, while also reflecting and being shaped by deeply embedded unconscious principles. Social scientists often accept the popular dichotomy between 'modern' and 'traditional', 'formal' and 'informal' institutions. Formal modern (bureaucratic) institutions are seen as more effective at resolving conflicts and rationally managing resources compared to informal or traditional institutions. This dichotomy is a false one: institutions formed through a messy *bricolage* process often survive both because they are perceived as legitimate and 'moral', and because they are often dynamic and effective as judged by the participants' expectations. On the other hand, bureaucratic institutions designed on the basis of abstract external principles lack legitimacy, their operational principles are unacceptable from the perspective of many of the people they are supposed to service, and they often prove ineffective when imposed from outside. Or they may work to some degree; but as is the case for externally imposed forms of local government, they may also be reshaped over time through a *bricolage* process. Unfortunately, imposed institutions may also have unintended consequences, such as reinforcing and even magnifying local power relationships.

It is not only institutions that are socially embedded and culturally valued, but also livelihood strategies themselves. Being a farmer, livestock herder, fisher, or some combination of these and other ways of earning a living is not simply a job isolated from other aspects in life. It is an integral part of who people are, their way of life, their social and psychological identity. These livelihood strategies are deeply rooted in peoples' culture, values, and belief systems, and indeed enable them to participate effectively in this social life. For example, possession of cattle in many African river basins is a source of social prestige and influence, not simply a store of economic value.⁷ Therefore, institutional arrangements for multiple social purposes (from practical resource management to religious life) and the multiplicity of livelihood strategies that people pursue are all to a considerable degree integrated, and the ways in which they are integrated are also dynamic, have moral value, and are constantly negotiated. They are 'socio-technical systems'; that is, there is a considerable but variable degree of integration among social, cultural, and technical dimensions. An important implication is that researchers and policymakers who perceive opportunities to improve peoples' lives by making major changes in farming, herding or fishing practices, for example introducing new crops or new water harvesting technologies, must recognise the social dimensions and institutional integration, and find ways to encourage innovation that is consistent with peoples' existing values and life patterns.

⁶ *Bricolage* is a term used in several disciplines to refer to the construction or creation of a work from a diverse range of things which happen to be available, or a work created by such a process. The term is borrowed from French, based on the verb *bricoler* – the core meaning in French being, 'fiddle, tinker' and, by extension, "make creative and resourceful use of whatever materials are to hand (regardless of their original purpose)"; in contemporary French the word is the equivalent of the English 'do it yourself'. A person who engages in *bricolage* is a bricoleur. Adapted from <http://en.wikipedia.org/wiki/Bricolage> (accessed 11 May 2011).

⁷ This is one of many cogent reasons why virtual water trade is not only an unrealistic institutional option for basins like the Volta but would cause enormous damage to people in the basin. See Youkhana and Laube, 2009.

Franks and Cleaver (2007) have developed a framework for analysing water governance, based on these ideas. Their framework is based on several key concepts: 'resources', 'actors', 'mechanisms', 'processes' and 'outcomes'. Briefly, 'resources' are the material and non-material goods (technology, environment, power over others, norms and values, etc) from which human interaction and social structures are constructed. 'Actors' are individuals, groups, and organisations, such as the state, that construct the context-specific arrangements for organising access to and use of water (governance 'mechanisms') through various 'processes' such as negotiation, decision-making, and taking action. The 'outcomes' are the social and environmental results, which may be positive or negative. An especially critical issue is the gendered outcomes for the poor: who benefits and who does not. This framework introduces two additional concepts missing from most institutional economic analyses: inequalities in power and how it is both constrained and enhanced by social structures and control over resources; and the harnessing of both social and material resources in the generation and use of power.

Cleaver and Franks (2005) use a case study from southwest Tanzania to critique nearly all of the institutional design principles listed in box 1, above. As noted in the previous section, these design principles are closely linked to 'accepted principles' of river basin management, such as that water should be managed based on its natural hydrological boundaries, in an open, transparent accountable manner involving all stakeholders, and should be integrated across sectors and scales (Rogers and Hall, 2003; Lenton and Muller, 2009). But social reality nearly always contrasts markedly with the ideal: social, cultural, and institutional complexities do not co-vary with resource boundaries; water is linked to multiple sectors, organisations and uses; and social values and norms, power and gender relationships, and diverse livelihood strategies are so complex and opaque that no comprehensive analysis or clear model is feasible.

Generalised design principles that seem logical to scientists and policymakers may violate strongly held values and ways of doing things in a given context. Consider design principles numbered 6 and 8 in Box 1: 'Decisions should be taken in public' and 'Graduated sanctions should be devised and applied consistently, rapidly, and impersonally'. There is considerable evidence from Tanzania and elsewhere that such principles ignore the reality of unequal and unbalanced power relationships and lead to exclusion of pastoralists, women, and poor households. Poor people are the most disadvantaged by public decision-making arrangements because of the high opportunity costs and their limited social networks (of course, they are disadvantaged in any case – decision-making in public forums does not level the playing field). Conflict resolution through public arenas and application of sanctions "consistently, rapidly and impersonally" violate strong social norms for conflict avoidance, generous interpretations of 'compliance', and using socially embedded "reconciliatory conflict resolution systems". Applying generalised principles introduces serious uncertainties when applied to given situations.

From social engineer to bricoleur

Many developing countries are characterised by 'dual governance systems', i.e. a perceived conflict between modern and traditional or indigenous institutions. Much of the social science literature analysing this phenomenon does so from a legal pluralism perspective. Legal pluralism refers to the existence and interactions of different normative orders, usually state and non-state, within the same socio-political space (Boelens et al., 2005). While national laws are based on 'universal' generalised principles, local institutions are characterised by diversity, specificity and dynamism. Local rules are not written and formalised and are, therefore, dynamic and easily reinterpreted in the light of new situations and ideas: they are repertoires of socio-legal principles drawn from multiple sources (Boelens, 2006). In other words, they provide the raw material for the *bricoleur*. In the name of modernisation, governments often attempt to impose uniform national institutional (legal) arrangements for managing resources (water, land) with very mixed and often negative results. For example, in the Andes, a

collaborative programme called Water Law and Indigenous Rights⁸ on indigenous irrigation schemes, examines and supports advocacy programmes on local water rights. There are serious tensions and conflicts when governments attempt to impose rigid and uniform national water laws and policies in a context of highly diverse ecologies and local conceptual and institutional arrangements for managing water, and conflicting conceptions of equity, empowerment, and justice (e.g. the articles in Boelens and Hoogendam, 2002; Boelens, 2006, 2008; Boelens et al., 2007). The Andes provides the richest published material on the conflict (and sometimes reconciliation) between modernising governments and strong local traditions; but similar work continues in Africa and Asia (see van Koppen et al., 2007). Rather than trying to impose uniform national laws, governments would be well-advised to encourage local institutional bricoleurs and support processes to achieve a higher level of equity and empowerment of disadvantaged people through a locally driven creative process within broad national frameworks.

The experience of Burkina Faso and Ghana in the Volta Basin is especially instructive though not unique. A report on the Volta Basin from the Challenge Program on Water and Food (Lemoalle, 2009) makes the following observation:

The basin states have a limited ability to implement and enforce policies and reforms at the local level. Social control is highly fragmented and policy implementation takes place in a context of multiple foci of power and multiple institutions. In the Volta basin, the duality between the legal state and the traditional hierarchy impacts every day's life and a number of social determinants such as land tenure and access to water... Competition between local authorities and formal institutions, and a lack of local legitimacy and poor enforceability of official rules, made resource management prone to conflict and renegotiation in the allocation of land in irrigated schemes in Ghana.

The 1996 Water Resources Commission Act in Ghana, which created the Water Resources Commission to implement the government's new IWRM policy, requires the Commission to consult the public before making decisions on allocation of water rights; and as part of this process it must collaborate and consult with 'traditional authorities' including "traditional water priests and priestesses" (Opoku-Agyemang, 2005). The official policy of the Water Resources Commission is therefore to work with and encourage customary practices that fit its concept of 'proper' water management. Practices and customs that violate this (e.g. "superstitious dogmas of water conservation practices such as sacrifices to request the gods to punish violators of existing rules to protect water resources"⁹) are to be eradicated; those that conform to 'proper' water management principles, for example, rules allocating specific parts of a water body for specific purposes, are to be institutionalized (Opoku-Ankomah et al., 2006). This process of adoption or rejection of indigenous practices is being pursued through formal administrative systems such as District Assemblies. Opoku-Agyemang (2005) claims this requirement to consult traditional institutions "ensures the consideration of traditional concepts and norms" which are "essential for the sustainable management and conservation of water resources in Ghana". This is at least a partial case of promoting a *bricolage* process. Nevertheless, national efforts to introduce 'modern' principles of IWRM such as charging for use of water are having impacts on, and displacing, indigenous practices: whether it is a creative process of accommodation or a process of imposition of new rules regardless of resistance is not entirely clear from existing studies.

Opoku-Ankomah et al. (2006) and Lautze et al. (2006) analyse from an historical perspective, the changing relationships between colonial and post-colonial attempts to impose new institutional principles for water management, and the continuing resilience of 'customary' institutional arrangements. The colonial authorities in what are now Ghana and Burkina Faso were happy to allow traditional institutional arrangements to continue at local level with minimal interference; and until

⁸ See www.eclac.cl/DRNI/proyectos/walir/homee.asp (accessed 11 May 2011).

⁹ This seems to be a quite reasonable custom, which may be effective among rural people. The Commission's unhappiness is surely coloured by a Christian or overly instrumentalist lens.

recently the newly independent governments also ignored these arrangements. This has changed during the last decade as IWRM-based institutional restructuring has led to more encounters with local institutions, and more research on how they can be incorporated into formal arrangements. Laube (2005, 2008) provides detailed case studies of this conflict on two medium-scale government-built and -managed irrigation schemes in the Upper Volta in Ghana (Tono and Vea), between state-driven reforms that are "transparent, accountable and participatory"; and a context with strong vested interests, corruption, and "clientelist networks", where national institutional frameworks and local norms and rules are used as a basis for argumentation and negotiation, not necessarily guidelines for action (ibid). The Tono Irrigation Project has a large number of actors with interests in local water management; the multiple identities of many actors and how they influence behaviour in complex ways, not least the senior government bureaucrat (as project manager, civil servant, commercial farmer and landholder in the scheme, church member, etc); and the importance of power, whether economic, political, or based on traditional roles. Recent detailed studies from the Mekong Delta (Evers and Benedikter, 2009a, 2009b) and the upper Ganges watershed in India (Subramanian, 2009) demonstrate the creative process of negotiation by new 'strategic groups' to take advantage of new opportunities in the Mekong, and how agents with roots in both rural society and the government bureaucracy are able to negotiate to their own advantage in the new decentralised governance system (India).

Is the inability of government to enforce its writ and impose 'modern' principles necessarily bad? The answer is not straightforward. For example, Lemoalle (2009) endorses the view that customary land tenure creates uncertainty and discourages land conservation. However, other authors have argued the opposite case based on considerable though not overwhelming evidence. Bugri (2008) found that in northeast Ghana, stakeholders do not perceive customary land tenure as insecure. Even though women are the main food producers, they do not have land rights. Nevertheless, other factors such as lack of finance seem to be more salient as explanations for low agricultural productivity. Ampomah and Opoku-Ankomah (2008),¹⁰ reporting on case studies of local water management in the Volta Basin (Ghana), found that the diversity of local arrangements combining indigenous and western principles seem complementary and not contradictory. They classify local water management institutions into three categories:

1. 'Value institutions', mainly traditional chiefs and ritual specialists emphasising social solidarity, culture, and traditional values as the basis for carrying out water resources protection and management.
2. 'Production institutions' promoting growth and economic development 'using Western organizational patterns' that have a statutory existence; examples are local district assemblies and NGOs.
3. 'Service-asset management institutions' that integrate productive and social goals. These have a long history in many areas and are indigenous in origin and organisation. Examples include water user associations, fishermen's and farmers' associations, women's and men's associations and local water and sanitation boards.

This Ghana study, in contrast to some others, shows the relative effectiveness in terms of cooperation and integration between indigenous and formal statutory organisations. Although the studies do not capture this, we can be confident the hybrid institutions for production and service-asset management were created through a negotiated *bricolage* process. Dixon and Wood (2007) provide an interesting case of wetlands management in western Ethiopia (the Nile Basin): local institutions that effectively

¹⁰ Some of the Ghana, Botswana and Zimbabwe cases are also discussed with different emphases and more detail in Merrey, 2009. That paper also emphasises the potential creativity of local water management processes, from the perspective of moving toward 'African' models of transnational river basin organisations.

regulate the use of the fragile wetlands but have always relied on external intervention to maintain their legitimacy (this is now breaking down).

Studies in the Limpopo Basin have also documented effective traditional local water resource management institutions in Botswana and Zimbabwe (Manzungu et al., 2008, 2009) even in irrigation schemes built and nominally managed by government in Zimbabwe; these findings are confirmed by other studies in Zimbabwe (for example, Derman et al., 2005). The underlying principles include:

culturally sanctioned stakeholder consultation processes; flexible rules that are applied in a way that recognizes the social web of relationships and the degree of water scarcity; priority to water for livelihoods rather than an artificial separation between domestic and productive water; a universal right to drinking water even in times of scarcity usually combined with broad rights to land and water for basic livelihoods (Derman et al., 2005); and exploitation of multiple sources of water for multiple uses (Merrey, 2009).

Much depends on the attitude and policy of government: in the Zimbabwe case, it seems to be *laissez faire*, a result of the weakness of government. In Botswana, Manzungu et al. (2009) document tensions and contradictions between local values and institutional arrangements, and the desire of the Botswana government for 'modernization'. While the government sees small dams and boreholes as providing opportunities for modernizing the cattle industry, local people value the symbolic meanings of their cattle and water resources and therefore resist commercialisation. In the Ganges (India) case cited above, the researcher found that it is traditional elites who are best able to take advantage of new opportunities created by 'modernization' of local government, by "dancing to the tune of democracy". In the absence of explicit government intervention in favour of the disadvantaged, the new institutional arrangements are simply strengthening and exacerbating existing stark inequities in power and wealth (Subramanian, 2009) – a point made by Cleaver (2002) for Tanzania, and that emerges from Laube's (2008) study of the Tono Irrigation Scheme in Ghana, as well as from a recent analysis of the changing relationships between sedentary farmers and transhumant herders in the Upper Volta Basin (Clanet and Ogilvie, 2009). These cases show that governments cannot impose their uniform arrangements. Governments and others can however encourage *bricoleurs* while also creating a broad institutional framework and intervening strategically to achieve greater equity and poverty reduction over time. Applied researchers can contribute substantially to this process.

Applied researchers as bricoleurs and assistants to bricoleurs

Engineering is science-based: the practical application of the laws of one or another branch of physics or chemistry and mathematics to create a new structure or technology. *Bricolage* – borrowing and improvising to solve problems – is an art form not a science: the creation of a new form out of existing material (including science-based technologies). Applied researchers who are seeking ways to improve peoples' lives through better management of land, water and crops come from science-based traditions, such as agronomy, soil science, soil and water management, engineering, or agricultural economics. Therefore, a science-based discipline offering 'principles' or 'laws' that can be applied to achieve better collective management of resources is attractive indeed; and a social scientist claiming to offer such science-based principles is likely to be accorded considerable respect (even a Nobel Prize). On the other hand, someone claiming to be a social scientist who tells fellow scientists that improving existing institutional arrangements or creating new ones requires encouraging *bricoleurs* without providing a clear step-by-step theory-based recipe or guideline will undoubtedly be met with considerable scepticism.¹¹

But that is exactly the advice emerging from this admittedly selective and incomplete review of social science concepts and their application to several river basins and other water management cases.

¹¹ Ostrom et al. (2007) warn practitioners and scholars not to fall into 'panacea traps', i.e., blueprints for a single type of governance system.

Introducing new institutions based either on 'modern' principles such as IWRM or on 'scientific' principles such as those identified by institutional economics will not necessarily prove robust, sustainable and effective regardless of their scientific merits as design principles. If they are imposed without evolving through an institutional *bricolage* process, local people may reject them as costly, illegitimate and cumbersome (Cleaver, 2002). On the other hand, we must not idealise 'traditional' or indigenous institutional arrangements either: they are often highly inequitable (for example disempowering women), unable to adapt to rapidly changing conditions driven by population growth, climate change and new technologies, and may also be losing legitimacy because of growing ineffectiveness. As Cleaver (2002) notes, "we should beware of normatively attributing value to particular types of [institutional] arrangement". Instead of viewing institutional plurality and tradition as dysfunctional, we should view their potential dynamism as providing opportunities for institutional creativity. The goal of new bureaucratic arrangements should not be to replace existing institutional arrangements; rather it should be to complement and strengthen positive aspects while encouraging a creative process to strengthen weak components and reform those that are unfair, non-inclusive, and inequitable.

These observations apply to the introduction of new agricultural or water management practices as much as to institutional change. As discussed above, livelihood strategies are deeply rooted in social and cultural life; and people are totally dependent on agriculture, fishing, etc. for their subsistence. Therefore, attempts to introduce new practices, technologies or institutions such as conservation farming, rainwater harvesting, irrigation, a new crop, a new set of rules to govern pastoralists' water access rights, need to begin with the reality on the ground, and work with people – technological and institutional *bricoleurs* – to test and adapt such innovations.

In several major African river basins (e.g. Limpopo, Niger, Nile, and Volta), there is broad scientific agreement regarding the potential for improving rain-fed agricultural productivity through better soil and water management practices combined with increased fertiliser use. But this view is focused entirely on sedentary farmers, excluding the large number of transhumant herders whose herds account for a large proportion of the basin economy, especially in the Volta and Niger (Clanet and Ogilvie, 2009). The growing conflicts between pastoralists and settled farmers, in which the pastoralists are disadvantaged politically by decentralisation policies of government, are a complex governance issue to which there is no easy solution. Finding effective solutions and answering the research questions raised will require far more nuanced socio-technical applied action research than has been carried out to date, but the returns in this and other basins to such research are potentially enormous.

These observations have important implications for research-for-development as well as development-only programmes. It is critical to combine seeking to understand the complexities of river basins as socio-ecological systems, for example through the use of remote sensing and modelling techniques, with efforts to identify practical interventions that will improve peoples' lives through better access to, and more productive but sustainable, use of water that can be implemented at a large enough scale to have measurable systemic impacts. Such interventions may be local (for example, better crop or water management by farmers) to medium or large scale (infrastructure, policies, institutions). The implication of the discussion in this paper is that all of these interventions must be well-informed by an understanding of the current organisational, cultural, political and institutional landscapes at multiple scales (not only at local level). This requires investing in using professionals with the right social science skills to work with other scientists at the research as well pilot-testing phases.

CONCLUSIONS: INSTITUTIONAL PATHWAYS FOR IMPROVED LIVELIHOODS IN WATER MANAGEMENT SYSTEMS

We conclude by outlining a few strategic considerations emerging from this analysis.

First is the clear need to include institutional factors in an account of management of water and food systems, and to understand the influence of development history on institutions, as well as that of institutions on development. If, for example, research demonstrates clearly that substantial benefits can be gained by promoting better soil and water management in rain-fed agriculture, we must also have a deep and thorough understanding of the broader context (who benefits, and who may suffer) as well as both the institutional impediments and the opportunities (incentives, interests, support needs, organisations that can hinder or promote, possible champions and local *bricoleurs*) for scaling out such interventions, from policy levels to local community levels.

Second is the need for a robust analytical framework to try to understand systemic properties, behaviours and interactions. Examples include models based on 'Social-Ecological Systems' that build in institutional variables (e.g. Ostrom, 2009); or the possibly more practical functional model proposed by Svendsen et al. (2005), which also includes institutional and organisational variables. This needs to be complemented by more nuanced local-level research to identify local norms, values, principles, role players, and organisations that may play roles in either promoting or impeding innovation. Adaptation of general insights is key. The tradition of social scientists represented by Ostrom is strongly nuanced: she is well aware of the importance of context and does not advocate uncritical application of the principles (though she would argue these principles do characterise most successful collection management institutional arrangements). Ostrom and her colleagues have made a significant contribution in demonstrating the critical importance of local institutional arrangements for resource management. Currently, this may be the most serious knowledge gap: we simply do not have sufficient systematic and reliable knowledge of the local institutional and organisational landscape to understand adaptive processes for decision-making, land use, water allocation and use.

Third, Ostrom's social-ecological models example draws attention to the need to broaden from management of water to management of ecosystem services in river basins and other contexts. Currently, institutional fragmentation leads to misdirected investments (for example, over-investment in irrigation, under-investment in improving rain-fed agriculture), inequitable sharing of benefits and risks, and continuing low levels of production. A more creative approach to encouraging collaborative management, through encouraging institutional creativity and *bricolage* processes is urgently needed.

Fourth, it is also important to be modest and realistic about what is possible, and therefore strategic in terms of what kinds of change we expect. Shah (2007) offers a distinction between the higher-level formal institutional environment and the local informal institutional arrangements characterising developing countries; in relatively poor countries, the local informal level is highly salient, being the basis for most of the actual economic activity in the country; and the formal level is relatively weak and ineffective, particularly when it tries to impose change on the informal level. Attempting to impose formal reforms such as pricing and new forms of organisation in informal local economies is ill-advised not because they are not needed, but because they will fail. The continuing attempts to implement IMT and specific WUA models, as discussed above, illustrates this observation.

Shah's (2007) advice is to focus attention on four areas: 1) improving water infrastructure and services through investment and better management; 2) promoting institutional innovations at higher levels that reduce transaction costs and rationalise incentive structures; 3) focus demand-management on formal large-scale sectors such as urban and industrial water use; and 4) use indirect instruments to achieve public policy goals in the informal sector. In other words, rather than attempting to impose new institutional arrangements and water management practices (for example water user associations, water pricing) at local levels, focus rather on facilitating positive processes and innovators (*bricoleurs*) at local levels to strengthen adaptive capacity, while at the macro-level, focus on putting effective infrastructure and institutions (through facilitated *bricolage*) in place. Over time, as the economy develops, the formal sector will expand and the informal sector will contract.

In the context of African transnational river basins, recent years have seen a proliferation of treaties establishing formal river basin management organisations, supported by international donors and based on international law. The argument of this chapter suggests that encouraging local action-oriented investment and innovation, supporting and building on local capacities to solve problems, will be far more effective than attempting to impose alleged 'universal' values or organisational forms (Merrey, 2009). This means the starting point is the local institutional landscape, social networks, and innovators (*bricoleurs*) identified through research and consultation, to be supported and facilitated by higher-level change agents and champions through policies and smart financing. At higher levels, the focus should not be on achieving IWRM *nirvana* (Molle, 2008), but rather using tools such as adaptive management principles to identify priority problems that can be solved and implementing the solutions in learning-oriented partnerships with key stakeholders.

This article has tried to make the case for increasing the use of social science research, from local to macro-levels. But this work should not be done in isolation; rather it must be well-integrated with the work of other disciplines and informed by a common but flexible analytical framework such as 'social-ecological systems' provide. Further, social scientists should not be the junior partners, charged simply with working out how to get the locals to adopt the research products of the physical scientists: they must be full and equal partners along with the various key partners in the basins themselves in designing and implementing the research, interpreting the results, and recommending actions. There also needs to be a substantial programme of local-level ethnographic case studies, designed around a shared but flexible analytical framework and well-integrated with local research on technical and physical dimensions, and focused on understanding local decision-making processes in their social and institutional context. Therefore, river basin research and development programs need to give central importance to understanding and facilitating the strengthening of local institutional and organisational arrangements. Fostering *bricolage* processes involves negotiating and facilitating local change agents' creative processes, not imposing new 'best practice' techniques.

Finally, the goals of water and food research and development programmes are to achieve food security, alleviate poverty and promote environmental security through better access to, and more productive but sustainable use of, water. However, there has been insufficient attention to identifying the real target of agricultural and water interventions. Those who are well-off or only moderately poor but have some social, financial, physical and natural capital will be better placed to respond to opportunities: this is illustrated by the irrigation scheme case studies from the Volta. These people are well-placed to take advantage of new opportunities such as new technologies, new business opportunities, or institutional reforms such as local governments with resources to invest, as illustrated by the Ganges (India) and Mekong Delta cases cited above. But what about the really poor, those who are most deprived, and do not have the resources to take advantage of new opportunities? What about marginalised groups, such as the semi-nomadic livestock herders in the Volta, who are not necessarily extremely poor, but have no political capital and cannot compete with those owning the land? Indeed these people – the very poor and the Volta livestock herders – are likely to be further marginalised and dis-empowered without special efforts aimed to support them. It is critical to be clear on the real target beneficiaries, and develop detailed nuanced understandings and insights on the institutional pathways to assist these beneficiaries.

We opened with a quotation from a novel, stating that battles are not won by generals and kings (or for that matter researchers and politicians); the outcomes of battles are the outcome of the individual actions of thousands of unremembered individual soldiers, who often improvise to stay alive. Social and technical innovation does not automatically happen as a result of researchers' findings and insights, and they do not occur because politicians or community leaders decree they should. The process of socio-technical innovation is a messy do-it-yourself *bricolage* process. Neither researchers nor politicians can determine the direction or pace of change. But with a deeper understanding of the institutional

landscape and social processes, researchers and politicians can support people to improve their livelihoods and well-being.

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