

**UNDERSTANDING WATER INSTITUTIONS:
STRUCTURE, ENVIRONMENT, AND CHANGE PROCESS**

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R. Maria Saleth*

Abstract

Water institutions are critical for enhancing the development impact of water resource management. But, considerable ambiguity and divergence persists as to the way they are to be approached and evaluated causing serious conceptual and policy distortions. Utilizing some recent developments in the literature on the subject, this paper presents a simple but generalizable framework for understanding, explaining, and evaluating water institutions and their change process. It uses an analytical decomposition of water institutions to show their endogenous and exogenous linkages, transaction cost approach to conceptually account for the role of various factors, and a stage-based perspective to shed light on the internal mechanics and dynamics evident in the process of water institutional change. Despite its analytical and theoretical orientation, the paper does have some major implications for the practical and policy dimensions of water institutional reforms. It indicates how the institutional design and implementation principles derived from the structure and context of water institutions can be used to promote reforms and demonstrates how a better understanding of the change process can lead to strategies for setting the overall reform climate, especially through public education, reform research, and institutional supply.

Keywords: Institutional design; Institutional education; Institutional environment; Institutional decomposition; Institutional structure; Political economy; Theories of Institutional Change; Transaction cost approach; Water institutional change; Water sector reforms.

1. Introduction

As the limits of the physical and technical approaches to water resource management are becoming more and more transparent, the policy attention is shifting increasingly towards the institutional reforms. In fact, the institutional arrangements governing water sector are undergoing remarkable changes in many countries around the world, especially during the past decade or so. These changes, which are more due to purposive reform programs than due to any natural process of institutional evolution, can be observed both at the macro and national levels (e.g., enactment of water laws, declaration of water policies, and organizational reforms) as well as at the micro and sub-sectoral levels (e.g., irrigation management transfer, informal water markets, and privatization of urban supply). These changes and their implications for water resources management are well documented with varying coverage, details, and perspectives (e.g., Easter, Dinar, and Rosegrant, 1998; Savedoff and Spiller,

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1999; Dinar, 2000; Saleth and Dinar, 2000; Gopalakrishnan, Biswas, and Tortajada, 2004).

Despite the critical importance of institutional reforms for enhancing the development impact of water resources management at different levels, considerable divergence persists as to the way water institutions are to be approached and evaluated. This obviously leads to a serious dissipation of research attention and distortion in reform policies. In the process, the critical linkages between formal and informal institutions as well as the structural and spatial linkages among local, regional, and national institutions are ignored to treat them as if they are operating independently in separate spheres and being governed by different set of factors. The reforms programs developed from such a limited and segmented understanding of water institutions often fail to have the expected impact on water resources allocation, use, and management because of their inability to exploit the tactical and strategic aspects inherent in water institutions and the course of their change process. Based on the recent work of Saleth and Dinar (2004), this paper tries to show how a better understanding of water institutions and the course of their change process can lead to reform strategies that can advance water institutional change at different levels and contexts with minimum economic and political transaction costs.

As to its specific objectives, this paper (a) describes the nature and features of water institutions together with their practical and methodological implications; (b) conceptualizes the internal structure and external environment of water institutions; (c) reviews the relevance of existing theories and presents alternative approaches for explaining and describing the process of water institutional changes; (d) indicates how reform design and implementation principles can promote institutional reforms by exploiting endogenous institutional features and exogenous political economy contexts, and (e) concludes with key implications for the theory and practice of water institutional reforms. As to its organization, from here on, the paper is organized, more or less, in line with these listed set of objectives. Although the paper is essentially theoretical and analytical in scope, it has major implications for practical policy, especially in promoting institutional reforms needed to underpin various strategies for water resources management adopted at different levels and scales.

2. Water Institutions: Nature and Features

Following the general definition of institutions (Commons, 1934; North, 1990a; Ostrom, 1990), water institutions can be defined as rules that define action situations, delineate action sets, provide incentives, and determine outcomes both in individual and collective decision setting in the context of water development, allocation, use, and management. For analytical convenience, these rules can be broadly categorized as legal rules, policy rules, and organizational rules (Saleth and Dinar, 2004).¹ Water institutions also share the same features characterizing all other institutions. First, institutions are subjective in origin and operation but objective in manifestation and impact

¹ These categories, in fact, correspond to the three rule groups identified by Ostrom (1990) in the context of local resource management institutions: i.e., constitutional-choice rules, collective-choice rules, and operational rules. For, laws are the outcome of constitutional choice and policies are the result of collective choice through political process whereas the organizations are the arms for implementing, enforcing, and monitoring the laws and policies.

Hodgson (1998).² Second, they are path-dependent in the sense that their present status and future direction are dependent on their earlier course and past history (North, 1990a). Third, the stability and durability properties of institutions do not preclude their malleability and diversity (Adelman, et al., 1992; Hodgson, 1998). Fourth, since institutions comprise of a number of functionally linked components, they are hierarchic and nested both structurally (North, 1990a; Ostrom, 1990) and spatially (Boyer and Hollingsworth, 1997). And, finally, institutions are embedded and complementary not only with each other but also with their environment defined by the cultural, social, economic and, political milieu (North, 1990a).

2.1. Implications for Institutional Change

Subjective nature of institutions underlines the central role that perceptual convergence among stakeholders plays in prompting institutional change. The perceptual convergence that can occur through the interaction of subjective and objective factors, in fact, represents the origin of the demand for institutional change. Path dependency, taken together with the relative durability and stability properties of institutions, makes institutional change to be essentially gradual, continuous, and incremental (North, 1990a). The hierarchic, nested, and complementary features of institutions suggest that structural and functional linkages among institutional components are rather pervasive. In view of these institutional linkages, a change in one institutional component can facilitate both sequential and concurrent changes in other institutional components. This suggests the scope for scale economies and increasing returns in institutional change (North, 1990a). Since institutions are embedded within the general environment characterized by a configuration of social, cultural, economic, and political factors, a change in one or more of these factors can also trigger institutional change. Thus, institutional change can occur due to changes both in endogenous factors (structural features within institutions) and in exogenous factors (spillover effects from institutional environment).

2.2. Implications for Institutional Evaluation

The implications of institutional features for institutional change are, in fact, well known. But, their analytical and methodological implications are either less known or not recognized so far. Let us focus here on two of these implications. First, the technical features of institutions are nothing but different forms of institutional linkages. For instance, path dependency relates to institutional linkages in a temporal context. Similarly, the hierarchic, nested, and embedded features of institutions characterize actually institutional linkages in a structural and functional sense. Although the transaction cost implications of these institutional linkages are recognized well in the literature, the role of these linkages has not been formally incorporated as part of the transaction cost theory. Second, the close resemblance between the institutional system and an ecosystem allows the development of the *institutional ecology principle* (Saleth and Dinar, 2004). While this principle seems trivial, it is powerful enough to provide the conceptual basis for developing the institutional decomposition and analysis (IDA) framework.

² Their subjective nature of institutions is evident as they are treated as 'belief system' (Veblen, 1919), 'behavioral habits' (Commons, 1934), 'mental construct' or the 'subjective model' of individuals (North, 1990a), and 'artifacts' that think and act through human medium (Douglas, 1986; Ostrom, 1990).

The IDA framework is a flexible tool for analytically decomposing water institutions at various levels and contexts. For simplicity, institutional decomposition can proceed in three stages. First, following North (1990a), water institutions can be decomposed into water institutional structure (governance structure) and water institutional environment (governance framework). Second, the institutional structure can be decomposed into its legal, policy, and organizational components. Finally, each of these three *institutional components* can be decomposed to highlight their underlying *institutional aspects*.³ As the IDA framework enables the evaluation of the structural and functional linkages within and between water institutional structure and its environment, it provides valuable insights into the internal mechanics and external dynamics of water institutions. While we will later show the tactical and strategic implications of these insights for designing and implementing practical reform policies, let us turn now to describe the internal structure and the external environment of water institutions.

3. Water Institutions: Structure and Environment

To show how the endogenous features and exogenous influences affect the performance impact and change process of water institutions, it is necessary to conceptualize their internal structure and external context. Water institutional structure includes the structurally nested and embedded legal, policy, and organizational rules governing various facets of water resource management. Water institutional environment, on the other hand, characterizes the overall social, economic, political, and resource context within which the water institutional structure evolves and interacts with the water sector. Under certain simplifying conditions, it is possible to provide a visual representation of both the structure and environment of water institutions.

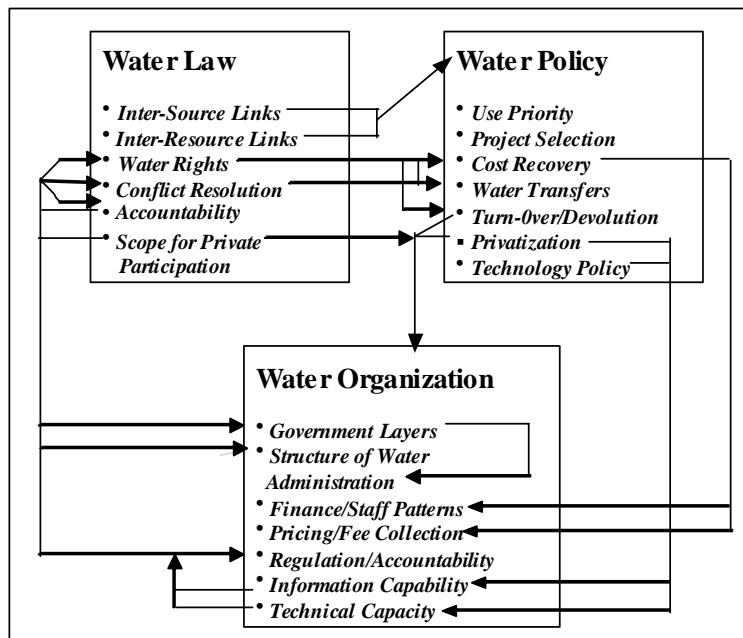
3.1. Water Institutional Structure

While it is possible to provide a complete description of the water institutional structure for any given national and regional context, for expositional convenience, it can be characterized in terms of some of the key legal, policy, and organizational components that are receiving major attention in national and global debates (Saleth and Dinar, 2004). Figure 1 depicts such a simplified representation of water institutional structure. While Figure 1 is self-explanatory, few points require attention. The overall performance of water institutions and their ultimate impact on water sector performance depends not only on the capabilities of their individual institutional components and aspects but also on the strength of structural and functional linkages among them.

The arrows in Figure 1 indicate an illustrative set of linkages possible both within and across the three institutional components. For instance, the legal aspects of how water sources and their relationship with land and environmental resources are treated within water law have linkages with the policy aspects such as priority setting for water uses and project-selection criteria. Thus, a water law that does not differentiate water by its source but recognizes the ecological linkages between water and other resources is more likely to encourage a water policy that assigns a higher priority to environmental

³ While decomposition can proceed further to the point of primordial rules and conventions forming the building blocks of institutional aspects, it stops at the third stage, as most of the theoretically and policy-wise relevant issues can be addressed by the IDA framework based on this three-stage decomposition.

imperatives and hydrological interconnectivity in project selection. Such a legal-policy linkage is also conducive for promoting an integrated water resource management. Notably, the legal aspect of water rights has multiple linkages with many other legal, policy, and administrative aspects. Similarly, the policy aspects pertaining to user participation, management decentralization, and private sector participation have strong linkages in terms of the ability to tap user support, fresh skills, and private funds while, at the same time, contributing to devolution and debureaucratization.



Source: Saleth and Dinar (2004)

Figure 1

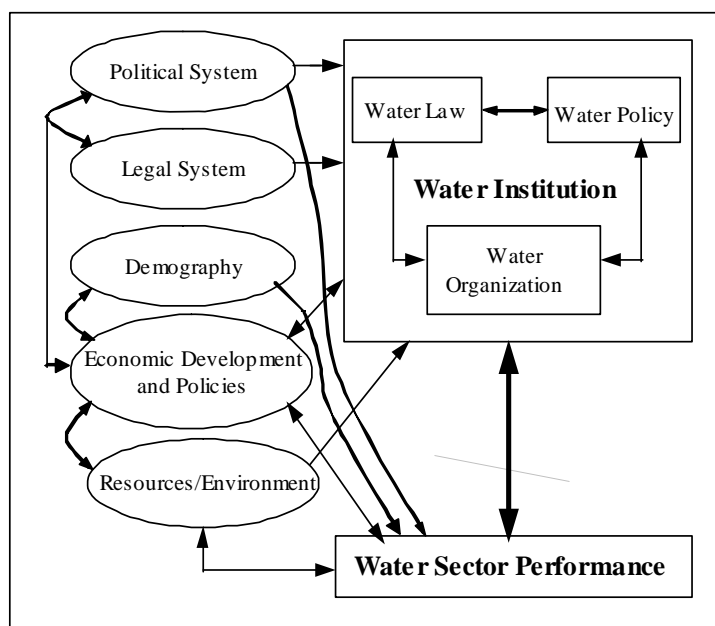
Water Institutional Structure: A Simplified Representation

3.2. Water Institutional Environment

Since the institution-performance interaction in the context of water resources occurs within an environment characterized by the interactive role of many factors outside the strict confines of both water institutions and water sector, institutional linkages and their performance implications are also subject to exogenous and contextual influences. The water institutional environment depicted in Figure 2, though partial, can enable us to conceptualize some of the pathways of these influences. As can be seen, Figure 2 has two analytical segments. The first segment captures the interaction between water institutions and sector performance and the other capturing the general environment within which such interaction occurs. From the perspective of institutional change, the two segments represent, in fact, the two main sources from which the actual pressures for reform originate and getting ultimately reflected in various mediums. Obviously, the first segment represents endogenous sources of institutional changes conveyed largely through economic, hydrological, and

institutional mediums whereas the second one represents the exogenous sources of change conveyed mostly through social and political mediums.

Figure 2 also provides a context for contrasting the narrow approach to institutional change focused exclusively on institution-performance interaction with a broader approach focused not only on such interaction and its larger institutional context but also on the strategic role of the internal dynamics within the water institutional structure itself. As a result, the broader approach can deal with institutional change both from institutional and political economy perspectives. In this approach, therefore, the context of institution-performance interaction is as important as the internal mechanics of such interaction because of the conditioning effects of exogenous factors. In many instances, the context can even explain better why similarly structured water institutions lead to a differential water sector performance. In fact, recent country experiences shows that exogenous factors (e.g., macro economic crisis, political reforms, trade policies, environmental problems, international agreements, and donor agencies) have played a dominant role in providing impetus for water institutional changes (Saleth and Dinar, 2000). At the same time, there are also many cases where institutional design and implementation



Source: Saleth and Dinar (2004)

Figure 2

Water Institutional Environment: A Partial Representation

principles based on various forms of institutional linkages (e.g., institutional prioritization, sequencing, packaging, and scale and timing aspects) have also been used to advance water sector reform process.

4. Explaining Water Institutional Change: Role of Theories

From the conceptualization of water institutional structure and its environment as well as the underlying broader institutional and political economy approach, it

is rather clear as to the possible set of factors that can explain water institutional change in different contexts. However, it is still necessary to understand how and in what forms these factors influence the process of institutional change. For this purpose, we can use some of the theories of institutional change available in the institutional economics literature. This exercise can also allow us to see which theories of institutional change are more appropriate to provide a more realistic explanation of the process of institutional change in the particular context of water sector.

4.1. General Theories of Institutional Change

There are a wide variety of theories to explain institutional change from different perspectives and contexts. An exhaustive review of these theories, especially from the perspective of water institutional change, is provided by Saleth and Dinar (2004). For the present purpose, we consider only a few major theories that can be used to explain the process of water institutional change. Broadly speaking, the theories of institutional change can be grouped into three distinct categories, i.e., evolutionary theories explaining the emergence of social conventions, market-based theories emphasizing institutional selection through competition, and bargaining theories explaining institutions in terms of asymmetries of power (Knight, 1995). While the evolutionary theories explain institutional change and survival in terms of social, cultural, and economic factors, the market-based theories (e.g., public choice theory and transaction cost theory) consider institutional change as endogenous to the economic process itself. But, North (1990a and 1990b) has generalized these theories to account also for exogenous and non-economic factors such as subjective perception and ideology. As the bargaining theories focus explicitly on the distributional consequences of institutions, they rely heavily on the role of political and social bargaining as a mechanism of institutional change (Knight and Sened, 1995; Levi, 1990).

Two additional but somewhat related categories of theories can also be considered. These pertain to the theories based on 'intentional institutional design' and those based on 'induced institutional innovation'. The former theories adopt a contractarian approach to explain institutional change as a product of free and voluntary exchange in the political market (Buchanan and Tullock, 1962). In contrast, the theories of induced institutional innovation place considerable emphasis on exogenous factors, especially the interactive effects of resource endowments, cultural conditions, and technological developments (Ruttan and Hayami, 1984). Interestingly, the theory of institutions based on collective action proposed by Ostrom (1990) fall in between these two categories of theories, as intentionally designed institutions co-evolve with their social, economic, and resource environment. The theory of voluntary and rational self-building of institutions proposed by Boyer and Hollingsworth (1997) also comes closer to this middle ground because organizational innovations are considered to originate from the rational calculus of individuals and firms as derived from a constantly changing economic environment.

As to their relevance for explaining water institutional change, the theories noted above are useful for explaining some, but not all, aspects of institutional change. For instance, the intentional design approach is useful to describe the drafting of water law, design of water policy, and the creation of or change in water organizations. But, it cannot explain why and how these changes are brought about. While the transaction costs approach can explain these aspects, it cannot explain the distributional consequences of the change process and how these consequences are handled through the process of

political bargaining. However, the bargaining-based logic clearly applies only to macro and formal institutions. Similarly, market-based theories are useful to explain some aspects of water institutions, but they cannot be generalized. However, the transaction cost theory, as generalized by North (1990a and 1990b) and with few additional adjustments made by Saleth and Dinar (2004), can provide a relatively more appropriate framework to bring together various endogenous and exogenous factors affecting water institutional change. While this theory is useful to explain how the factors affect institutional change, analytically, it is not capable of explaining the dynamics of the change process. For this, we need also other theories such as those based on subjective perception, demand-supply factors, economic and political markets, bargaining, intentional design, and organization and bureaucracy, which play varying roles in different stages of the process of institutional change.

4.2. Institutional Transaction Cost Theory

Although the transaction cost approach was originally developed purely in an economic context (Coase, 1937; Williamson, 1975), it was subsequently amended by North (1990a and 1990b) to allow for the role of the real costs associated with many non-economic and non-market aspects. While this extended framework is useful to capture the individual and interactive effects of both the economic and non-economic factors within a common analytical context, it still excludes the transaction cost implications of the endogenous institutional features. While these implications are recognized well in the literature (e.g., North, 1990a; Ostrom, 1990), they have not been formally incorporated into the transaction cost framework. Saleth and Dinar (2004) have not only incorporated the role of institutional linkages in their generalized institutional transaction cost approach but also recognized their strategic role as a basis for developing institutional design and implementation principles.

Let us now interpret the institutional transaction cost framework for the context of water institutional change. As discussed already, the factors influencing water institutions can be grouped into endogenous factors that are internal to water sector and water institutions and exogenous factors that are outside the strict confines of both water sector and its institutions. The endogenous factors related to water sector include water scarcity, water conflicts, financial and physical deterioration, service levels, and water-related ecological effects (e.g., waterlogging and salinity). The same related to water institution include institutional linkages and path dependency. The exogenous factors include economic development, demographic growth, technical progress, economic and political reforms, environmental crisis, international commitments, donor roles, and natural disasters such as floods and droughts. Since the exogenous and endogenous factors are interrelated and their relative impacts differ by context, it is difficult either to isolate their individual roles or to generalize the direction of their effects. But, their effects can be tracked within the institutional transaction cost framework by conceptualizing them as part of either the transaction costs or the opportunity costs of institutional change.

For water institutions, the transaction costs cover both the real and monetary costs of altering the regulatory, monitoring, and enforcement mechanisms related to water development, allocation, and management. These costs are subject to scale economy effects from institutional linkages as well as the negative (or, even, positive) effects from path dependency constraints. Similarly, the opportunity costs cover both the real and economic value of opportunities foregone, which, in fact, represents the net social costs of '*status quo*'. The opportunity and transactions costs of institutional changes are

not static but change continuously due to the effects of factors both endogenous and exogenous to water sector and water institutions.⁴ As the reforms initiated in the early stages brighten the prospects for downstream reforms, there are intricate linkages between the transaction costs of earlier reforms and those of subsequent reforms.⁵ While it is possible to estimate these costs and benefits in *ex-ante* and *ex-post* contexts using both quantitative and qualitative information,⁶ the framework is equally valuable as an analytical tool to understand the individual and joint effects of various factors affecting the process of water institutional change (Saleth and Dinar, 2004).

5. A Stage-Based Perspective of the Change Process

The transaction cost theory does capture the role of various possible factors influencing water institution change. But, it can neither depict the dynamics of the change process nor show how the same factors play diverse roles during different stages in the process of institutional change. As the theory presumes that a social planner making the transaction cost calculus for the society as a whole, it could not recognize the potential for divergence in the reckoning of the transaction costs across individuals and groups, who make the calculation on different aspects and at different stages of the change process.⁷ In this case, there is a need for an explicit attention on the scope for convergence as well as how the conflicts from divergence are resolved through the political bargaining and implementation adjustments. For a better and more realistic description of the process of institutional change, therefore, we need to use different theories in a complementary way. It is in this spirit, Saleth and Dinar (2004) have proposed a stage-based approach as a general framework for linking different theories to provide a simple but complete description of the process of water institutional change.

5.1. Stages of Institutional Change

From a stage-based perspective of the process of water institutional change, four stages can be identified along with their underlying factors, processes, and

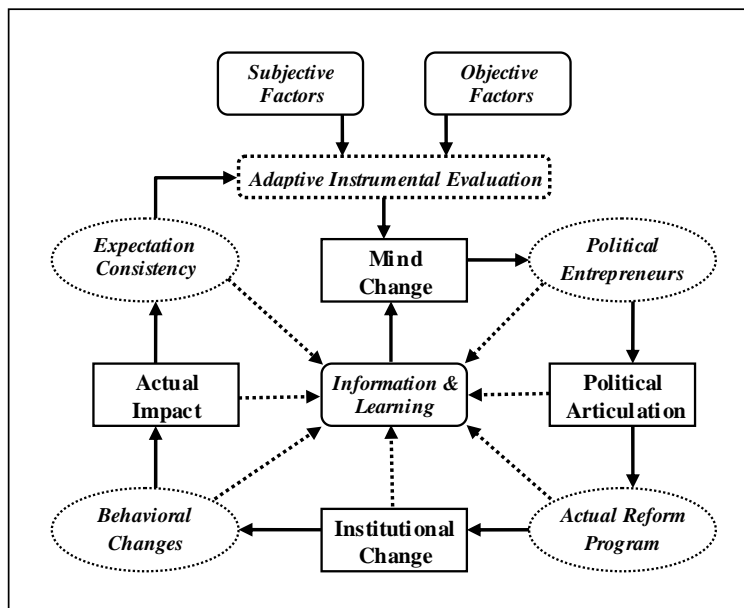
⁴ For instance, as water scarcity becomes acute, the real and economic costs of inappropriate water institutions tend to rise. Similarly, these costs are relatively high in the early stages of reform, but tend to decline as institutional maturity through stronger institutional linkages facilitates further changes.

⁵ For instance, with the establishment of transferable water rights, the prospects for other institutional aspects such as conflict resolution, water markets, and cost recovery become brighter in view of the linkages that the transactions costs of the latter aspects have with those of water rights. Scale economies are also possible in transaction costs as the costs of effecting water institutional changes will be lower when water sector reform forms part of a larger country-wide economic and political reform program.

⁶ For instance, the performance implications of institutional linkages can be quantified in terms impact transmission coefficients (e.g., Saleth and Dinar, 2004) and the political economy constraints can be captured in terms of political risks (e.g., Dinar, Balakrishnan, and Wambia, 2004). Such a reckoning of these costs and benefits need not cause any distort or dilute the neo-classical rigor of the transaction cost theory.

⁷ For instance, a water user considers an institutional change in terms of its socio-economic benefits and costs whereas a political leader considers the same in terms of electoral prospects or rent-seeking possibilities. In both cases, the calculus can also vary across persons and over time.

applicable theories. The states are: (a) mind change, i.e., the perceptual convergence among stakeholders at various levels, (b) political articulation, i.e., the crystallization of the demand for institutional change, (c) actual institutional change, i.e., the implementation of the reform program, and (d) ultimate impact of institutional changes, i.e., the perceptible flow of benefits. These stages progress as a circular process and it is subject to constant subjective and objective feedbacks, learning, participation, and adaptations. The process is influenced both by subjective factors (e.g., ideology, bias, and ignorance) as well as by objective factors (e.g., relative prices, technological change, and other economic, physical, and political factors). It is also affected by other factors operating both at the individual and macro levels such as instrumental evaluation, political lobbying and bargaining, information flow and learning externalities, organizational power and politics, behavioral changes and performance expectations, and public participation and influence. Notably, the circular process is not free from the influence of existing institutions partly due to their technical features such as path dependency and partly due to their effects on the worldview of the main actors. Figure 3 depicts the four stage-based process of institutional change in a stylized form.



Source: Saleth and Dinar (2004)

Figure 3

A Stage-based Conception of the Process of Change

Despite a fair amount of simplification as to the specifics and time dimension of the reform process, Figure 3 is able to highlight the roles that some of the key factors play during the process of institutional change. Of the four stages, the first stage involving mind change assumes a critical significance. The mind change signifies a change in the mental construct of individuals and it gathers power when there is a critical mass of convergence as

to the need, extent, and direction of institutional changes.⁸ The mind change and perceptual convergence occur among individuals not only from their adaptive and instrumental evaluation of subjective and objective factors around them but also from the information feedbacks and learning experience they gain from existing institutions and ongoing changes. Since perceptual convergence means an implicit demand for institutional change, political entrepreneurs with an eye on electoral payoffs articulate such demand in the political spheres with their campaigns and lobbying.⁹ This leads to the second stage of political debate and articulation.

The political agreement as to the need for change does not mean an agreement as to the details and formats of change in view of the potential for divergence in the economic and political transaction cost calculus of different social and political groups. This leads to an intense debate, bargaining, and even, counter-campaigns. Thus, the reform program that would emerge at the end of the political process is an outcome the relative bargaining strength of the political and interest groups.¹⁰ From the perspective of the demand and supply of institutional change, the second stage is very critical as it is where the implicit demand for change is explicitly articulated and a politically and technically consistent reform program is developed to take the process to its third stage of reform implementation. There is a considerable scope for slippage between reform implementation and actual change in institutions, especially in a democratic system. Often, the implementation proceeds with changes, which are mostly ceremonial and procedural in nature (e.g., policy declarations, legislative enactments, and renaming or merging of organizations) and ends up just with an euphoria, but without any substantive change. Although such a false impression may keep the demand for reform dormant for a while, even these procedural changes can also have a facilitative role both in realigning political groups and in creating a pro-reform atmosphere conducive for undertaking the real and substantive changes (e.g., legal reform, devolution and privatization, price revisions, creation of water rights, and changes in water allocation principles).

Implementation stage is very crucial as it represents the actual supply process of institutional change. In this stage, financial, organizational, and bureaucratic aspects play a major role. In cases where the reform is likely to dilute the power of existing organizations, there will be some resistance. Similarly, power struggle among water-related organizations can also compromise implementation. However, the political and resource commitments at the top and continued oversights and pressures from below can ensure a consistency between the reform program and its practical translation and take the process to its fourth stage where the ultimate economic impacts of

⁸ Perceptual convergence also has implication for both the overall costs of as well as the ultimate gains from institutional transactions. The magnitude of this effect, however, depends on the extent that changes in subjective perception leads to actual changes in attitudes and behaviors.

⁹ The issue of whether such initiatives—considered as public goods—will be taken by the political entrepreneurs depends not on any *ex-post* benefit-cost analysis but on their *ex-ante perception* of a tangible political benefit to themselves or to their political parties (Knight and Sened, 1995).

¹⁰ But, the bargaining process is not free from the financial implications of reform, changing economic and resource realities, and the technical and financial constraints imposed by factors such as path dependency, donor conditionalities, and international agreements.

institutional change are realized. Even with substantive changes in institutions, its impact on economic performance is not immediate but has a very long gestation period. The direct outcome of institutional change is actually a process of behavioral changes and their ultimate outcome depends on the extent that these behavioral changes improve the process of actual usage and exchange. The material outcome of this process is, therefore, not immediate but goes far beyond the program period. As a result, subjective and instrumental evaluation is also important even during this fourth stage.¹¹ These subjective evaluations constantly feed into the process of mind change along with the objective factors and learning experience, and get internalized within the circular process of institutional change. In fact, as can be seen in Figure 3, the subjective instrumental evaluation of information and learning experience plays a central role during the entire process of institutional change.

5.2. Complementary Roles of Different Theories

Having described the stage-based perspective institutional change, now, we can show how different theories can explain the reform process in different stages of the process. Since the literature on institutional economics offers no theory to explain the process in the first stage, Saleth and Dinar (2004) have proposed a subjective theory of institutional change by linking the roles that 'subjective model' of individuals (North, 1990a), 'collective attitude' (Bromley, 1989), and 'adaptive instrumental evaluation' (Tool, 1977; Bromley, 1985; Livingston, 1993) play during the process of institutional change.¹² The basic idea of this theory is that perceptual convergence among individuals or stakeholders, as induced by their adaptive instrumental evaluation of subjective and objective factors including information and learning, represents the main source of institutional change.¹³ The process in the second stage can be explained in terms of bargaining theories including the political economy theory of rent-seeking and interest group politics.

The theory of intentional institution design and contractarian approaches can be used to explain the process of reform formulation. Similarly, the process in the reform implementation stage can be explained in terms of organizational and bureaucracy theories. It is also clear how and by whom the transaction costs are calculated during the reform process. The calculation is based mostly in an *ex-ante* context and performed both by individuals and groups in evaluating different components of the reform. It influences the convergence in the perception of stakeholders, lobbying decisions of political entrepreneurs, choice and priority of reform components by the state, and the tactics and strategies of implementation by the bureaucracy. From a general perspective,

¹¹ Thus, perceived behavioral changes can be used to evaluate the effectiveness of institutional changes and the perceived gap between expected and actual performance can be used to evaluate the impact of institutional changes.

¹² The process of 'mental accounting' in which people organize the outcomes of transactions and evaluate them relative to a 'reference point' (Kahneman and Tversky, 1984) can be identified as the mechanism that is being used by individuals for adjusting their subjective evaluation. The reference point can be either the instrumental values or status quo outcomes, or both.

¹³ While perception can diverge due to the effects of ideology, bias, and ignorance, it can also converge both due to the role of cultural influences and persuasive powers of the state or other moral authorities (Bates, 1994) as well as due to the powerful effects of interaction, information, experience, and learning (North, 1990a).

therefore, the stage-based perspective also indicates the way various theories can be used, in a complementary way, to explain the dynamics in different stages of the process of water institutional change. In this sense, the stage-based approach enables us to link various theories of institutional change within a logical framework.

6. Water Institutional Reforms: Tactics and Strategies

The stage-based perspective of institutional change shed lights on the role, configuration, and relative significance of various subjective, economic, political, and organizational factors involved in different stages of the change process. While these factors lead to changes in different stages of the process, the change process is not entirely evolutionary. Deliberate and purposive policies can substantially alter or reinforce the course of institutional change. As we have seen, these policy options and reform strategies are implicit not only in the institutional features and their implications for institutional change and transaction costs but also in the mechanics of the stage-based process of institutional change. Let us briefly outline some of them.

6.1. Design and Implementation Principles

Saleth and Dinar (2004) have perceived the options and strategies for promoting institutional change in terms of the reform design and implementation principles developed from the way institutions and their transaction costs are influenced by internal institutional structure and external institutional environment. For instance, the presence of various forms of structural and sequential linkages among institutional components provides the scope for developing institutional design principles such as institutional prioritization, sequencing, and packaging. These principles have the ability to promote institutional reforms with minimum transaction costs and political opposition but maximum success and impact. Thus, institutional prioritization enables us to target reform efforts and investments on those components having a greater probability of success and immediate performance returns. Similarly, there is also a vast scope for minimizing transaction costs with alternative sequencing and packaging of reform components. For instance, the sequential linkages among institutional aspects (e.g., user organization, cost recovery, water rights, accountability, and conflict resolution) can be used to enhance the prospects for upstream institutional changes by exploiting the scale economy benefits and path-dependency properties. Reform packaging (e.g., linking price revisions with system improvements or quantity assurance; packaging reforms within an investment program) also have similar effects.

Besides the institutional design principles, there are also implementation principles indicating how and when to initiate and deepen the reform efforts. Obviously, these principles are based on the strategic roles played by exogenous factors. For instance, the political economy contexts provided by changes in the overall institutional environment (e.g., macro economic crisis, political reforms, droughts/floods, or international/bilateral agreements) can be exploited with an appropriate timing and scale of institutional reform programs. Thus, economic crisis and natural disasters provides a favorable context for initiating even radical program with least political opposition. Similarly, when water sector reform forms part of a larger political or economic reform, its overall economic and political transaction costs are likely to be lower due to the synergy effects and scale economy benefits. Similar is also the case when water reforms are undertaken to cover more sectors and regions and such scale economy effects on the political and financial transaction costs can be

substantial.¹⁴ Donor pressures and international water-related or general agreements can also be used to promote reforms that are otherwise difficult politically.¹⁵ Interestingly, besides their economic and technical implications, institutional sequencing and packaging also have strategic roles in relaxing political economy constraints. For instance, institutional sequencing (e.g., undertaking first the politically easier reforms) can bypass political opposition by concurrently creating a pro-reform climate and strengthening the pro-reform groups. Similarly, institutional packaging (e.g., combining reform options favoring different groups) can also help in building pro-reform political coalitions (see While, 1990; Haggard and Webb, 1994). Within the context of the stage-based process of institutional change, these roles are very critical for sustaining the change process, especially during the second and third stages dominated by the political factors.

6.2. Learning, Research, and Institutional Supply

Besides the design and implementation aspects, the reform process can also be influenced by altering the general reform climate. The pivotal status of learning and information in Figure 3 clearly suggests the important roles that education, information, and knowledge can play during the entire process of institutional change. Research can affect not only the demand side of institutional change by providing more information and knowledge products but also its supply side by providing institutional options and implementation strategies based on country-specific and cross-country reform experiences. Unfortunately, the supply side of institutional change is a less studied aspect in institutional economics and the role of research is an underestimated dimension in actual reform policies (Saleth and Dinar, 2004). But, the role of institutional supply is becoming more and more important as purposive changes in institutions are critical to short-circuit the long process of natural evolution and to shape the direction of the ongoing process of institutional change.

From the perspective of institutional supply, the state also plays a major role as a source of institutional change. In fact, the new institutional economics assigns a key role to the state in creating and enforcing stable systems of property rights. In fact, it is these institutionalizing functions that enable the state to reduce the transaction cost per unit of exchange (North, 1990a). Such scale economy effect makes the state as a more efficient mechanism than other governance arrangements for lowering the overall transaction costs of both market and non-market institutions (Eggertsson, 1996).¹⁶ In addition to these maintenance roles, the state also has a more active role as the supplier of

¹⁴ South Africa provides an interesting case for the scale economy benefits of both undertaking a nationwide water reforms as well as its packaging with the overall economic and political reforms. The relative transaction costs of water reforms have been reduced due to wider coverage and strategic links with the national reconstruction programs.

¹⁵ Donor pressures can cut both ways as they are used as much to promote reforms (e.g., India) as to derail the reform proposals (e.g., Sri Lanka). Instances for the way international agreement can affect the reform prospects include the role of the Water Framework Directive in the European Union and that of the subsidy reduction requirements of general trade agreements under the provisions of the World Trade Organization.

¹⁶ While it is good to develop and supply institutions that strengthen voluntary and market-based exchanges, it is not necessary to leave institutional supply entirely to the market process. This is because that the society also needs non-market and purposively designed institutions (Boyer and Hollingsworth, 1997).

institutional change (Alston, 1996).¹⁷ Moreover, given the coercive and persuasive powers of modern states, they can also play mediating and facilitative roles, particularly in avoiding dead ends possible in markets and negotiations (North, 1981 and 1990a). Unfortunately, researchers and donors often ignore this fundamental institutional role of the state and take an angular position of viewing the state in conflicting terms with market and private initiatives. Donor and funding agencies, national and international research and technical organizations, and multilateral and bilateral economic and political agreements can also affect the supply side of institutional changes both in general and in water contexts (White, 1990; Haggard and Webb, 1994; Saleth and Dinar, 2004).

7. Concluding Remarks

Utilizing the theories and principles of institutional economics and the recent work of Saleth and Dinar (2004), this paper has presented an alternative but theoretically consistent way of understanding, explaining, and evaluating water institutions and the course of their change process. Although its focus is on the macro and formal segments of water institutions, the framework based on institutional decomposition exercise, transaction cost approach, and stage-based perspective of change can be generalized and applied to basin and local contexts. Despite its analytical and theoretical orientation, the paper does have major implications for the practical and policy dimensions of water institutional reforms. Specifically, the endogenous and exogenous features of institutions are used to derive the institutional design and implementation principles having considerable tactical and strategic advantages not only in exploiting institutional linkages and synergies but also in countering the political economy constraints for change. Similarly, the stage-based perspective of institutional change is used to demonstrate not only the variations in the configuration of factors operating in different stages of the change process but also the centrality of stakeholders' learning and information during the entire process of institutional change. This demonstration clearly underlines the roles of education, research, and institutional supply as specific strategies for setting the general reform climate promoting institutional change.

Although the standard explanation for the absence or lack of reform is linked with transaction costs, political economy constraints, and stickiness of institutions, the paper shows how these constraints can be overcome through careful reform strategies and public policies. In fact, cross-country review of recent reforms clearly suggests that many countries have, in fact, advanced their water sector reforms through a clever exploitation of the opportunities and contexts provided by these very factors that are usually considered to constrain the reform process. Although the demand-side role of education and the supply-side role of research are now being increasingly recognized, they are not yet getting the policy attention they deserve because of the mistaken view that their effects are slow, remote, and marginal. But, considering the fact that ambiguity in the understanding and divergence in the interpretations of institutions often constitute as the initial but critical stumbling blocks for institutional reforms in many contexts, the institutional roles of education and research can be immediate, substantial, and indispensable. The way water institutions and their change process are conceptualized here can be a starting

¹⁷ For instance, economic development in Western Europe is historically connected with the state's role in establishing and enforcing property rights, weights, measures, legal institutions, banking institutions, and capital markets (North, 1990a).

point for developing institutional learning and evaluation tools to facilitate a better and consensual understanding of institutions among both the public and policy-makers. Public policy in this respect is as important, if not more, as the design and technical aspects of water sector reform policies.

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