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Indicators for the Measurement of Institutional Performance Concerning Water Management. Application for Uzbekistan and Ghana.

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Introduction

The management of natural resources receives increasing attention all over the world. The unsustainable exploitation of these resources endangers the existence and welfare of current as well as future generations. One of these resources is water, which is the subject of major concern in several countries. The equitable and efficient distribution of water is vital for its sustainable use as well as for solving conflicts at national and international level. Therefore adequate management practices are needed. Throughout the time several formal and informal institutional arrangements have emerged all focusing on the management of water. Their success in performing this duty differs from country to country. The evaluation of these institutions' efficiency is important, since it can facilitate comparing them with other more efficient institutional arrangements, and possibly show the direction of change. Therefore indicators should be employed for assessing the performance of institutions in a comparative manner. The purpose of our study is to find the indicators which could capture the most important aspects of institutional performance of water management. Furthermore, we apply these indicators for the cases of Ghana and Uzbekistan, to verify their adequacy.

For this purpose we follow the definition of North (1990) addressing institutions in a much broader sense as organization. According to North (1990) "institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. In consequence they structure incentives in human exchange, whether political, social or economical."(p. 3). Though institutions are not identical to organizations, they reciprocally influence each other. These latter ones are defined as groups of individuals brought together by some common purpose to reach their objective. In our paper we account for both the organizational structure, therefore the agents of institutional change, as well as the institutions, the underlying rules of the game.

We choose Ghana and Uzbekistan for the case study and we will consider only the irrigation sector. There are numerous reasons for our choice. First, both countries face the severe

environmental problems related to water as well as the environmental consequences of extensive water use. These problems require cooperation at the international level as well as specific institutional arrangements on national, regional and local levels. Second, we consider that the water management institutions in both countries are in a transition process towards some degree of private institutional structure. Therefore describing the performance of their institutions with the help of the indicators can show if the defined indicators are able to capture the most important dimensions of institutional performance in the transition process. In Ghana informal institutions have more room for manifestation than in Uzbekistan, both of them being confronted with the challenge of increasing the efficiency of institutions. This characteristic allows us to analyse the institutional performance in transition starting from two different ends, therefore our findings can be generalized to a greater extent. Lastly, there are two projects underway in ZEF, each of them focusing on one of these countries. Therefore it is interesting to make a comparative analysis of these two countries.

The structure of the paper is the following. In the first part we overview some of the indicators employed for the measurement of institutional performance. In this exercise we distinguish between formal and informal institutional indicators. In the second part we present the cases of Ghana and Uzbekistan with respect to irrigation, by applying the indicators described in the first part. Moreover we discuss the similarities and differences of the two cases. In the last section we conclude.

Indicators of Institutional Performance of Water Management

Evaluating Institutional Performance

The use of resources in common and the negative consequences on the environment are widely addressed in the literature. From Hardin's (1968) famous article this problem has become well-known as the "tragedy of the commons". Ostrom (1990) underlines the existence of the free-rider problem with respect the commonly used resources. In order to

solve these problems, some researchers argued that state intervention is needed, while others favoured the introduction of private property rights.

We believe that the institutional performance cannot be simply attributed to the existence of private or public institutions, neither to those of formal or informal institutional arrangements. The institutions should find the state where they can function with the lowest transaction costs, by combining the formal institutions with the informal ones. Therefore they should adapt to the already existent institutional setting, and improve it by finding the most efficient-lowest cost equilibrium.

Measuring the institutional performance is in itself questionable, since it refers to the quantification of the performance of rules, norms of behaviour and traditions. Here the question arises how rules or norms of behaviour can perform. In fact not the institutions are the ones that perform, but their presence influences the performance, efficiency of natural resource management. Therefore they can be evaluated only in an indirect way, by analysing their impact on the state of the water sector, on water management and thus on the well-being of the target groups. Moreover the presence of some characteristics in an institutional setting which in other examples brought about successful water management could be considered as an indicator of performance.

This latter approach is again questionable, since however some institutional arrangements perform well in one country or region, there are several factors that are not counted for, which influence the efficiency of these institutions in the respective setting. The uncounted factors are the overall socio-economic and political environment as well as the informal institutions. Thus one institutional setting successful in one case may fail in the other.

There are only a few studies, which explicitly use indicators for evaluation of the performance of institutions of natural resource management. There are some that describe the preconditions for well functioning institutions. On their basis we include the indicators in the following categories: indicators of formal and those of non-formal institutional performance.

Indicators of Formal Institutions

Saleth and Dinar (1999) have a quite comprehensive and applicable approach to evaluating institutional performance. They attempt to quantify it through effectiveness of the elements of institutions, the inter-linkages between these components and the inter-linkage between institutions and water sector performance. In this exercise they focus mainly on formal institutions, the informal institutions like conventions, customs and norms of behaviour are left out of the analysis. They reason this by saying that when quantifying institutional performance, the formal institutions could be characterised in the first place in an internationally standard comparable way.

When analysing the effectiveness of the institutions, Saleth and Dinar decomposes them into their constituent components, and the constituent components further into the aspects of the components. They approach the indicators through individual and interactive effect of the components of institutions on institutional performance, as well as through the impact of the socio-economic, political and resource related environment in which they function.

They consider the following components of institutions: law, policy and administration. Applying this approach on the specific case of water management institutions, they define them in terms of water law, water policy and water administration. To be able to evaluate the effectiveness of each component, they take into consideration the aspects that are within each and the strength of linkages to other components. They develop the indicators not only on the basis of their ability to reflect the "performance" of given component or aspect, but also depending on the possibility to translate it into a numerical way.

In water law they include the following aspects: legal treatment of water and related resources; format of water rights; provisions for conflict resolution; provisions for accountability; scope for private sector participation; centralization tendency; degree of legal integration within water law. The indicators related to these components are presented in Table 1.

Table 1 Effectiveness of Water Law

Indicator	Evaluation
Legal treatment of water and related resources**	Better performance the more alike surface and subsurface resources, sectors, consumptive and non-consumptive uses are treated
Format of (surface) water rights	Range from the worst to the best: no rights, unclear/unauthorized/scattered rights, common/state property, riparian system, appropriative system, correlative (proportional sharing) system, licenses/permits
Effectiveness of conflict resolution mechanism****	Evaluated in terms of judgmental perception, distinguishing between bureaucratically, administratively rooted systems (e.g. national water councils), decentralized systems, (river boards, basin level organizations, Water Users Associations), tribunals, judicial/legislative mechanisms, and multiple arrangements.
Effectiveness of accountability provision	Evaluated in terms of judgmental perception: Those related to officials like indemnity clause, penalty provisions, administrative actions, and those related to users like injunctions, sanctions, and tortuous liabilities.
Extent of centralization tendency within the water law	Evaluated in terms of judgmental perception (the bigger the share of decentralization the better it is)
Legal scope for private sector participation*	Evaluated in terms of judgmental perception
Ability of integrated treatment of water from various sources***	Evaluated in terms of judgmental perception

Source: Saleth and Dinar (1999)
****the aspect found most significant on the basis of empirical evidence for explaining the effectiveness of water law; ***second most significant; **third most significant; *significant

The aspects of water policy are: project selection criteria, pricing and cost recovery, inter-regional/sectoral water transfer, private sector participation, user participation and linkages with other economic policies. The indicators Saleth and Dinar selects with respect to this component are shown in Table 2.

Table 2 Effectiveness of Water Policy

Indicator	Evaluation
Use Priority	Between different sectors if not specified in the law
Project selection criteria**	Range from the worst to the best: political dictates, equity factors, ecological factors, benefits-cost ratio, internal rate of return, multiple criteria.

Indicator	Evaluation
Level of Cost Recovery****	Range from worst to best: full subsidy, partial recovery, full-cost recovery.
Smoothness of inter-regional and inter-sectoral water transfers	In terms of judgmental perception
Impact of private sector promotion policy	In terms of judgmental perception
Impacts of policy promoting users' participation	In terms of judgmental perception
Extent of influence of other policies on water policy*	In terms of judgmental perception. The policies include: agricultural policies, energy/power policies, fiscal policies, economic policies, credit/investment policies, environmental policies, trade policies, and foreign policy
Linkage between water law and water policy***	In terms of judgmental perception

Source: Saleth and Dinar (1999)
****the aspect found most significant on the basis of empirical evidence for explaining the effectiveness of water policy; ***second most significant; **third most significant; *significant

The aspects of water administration are: spatial organization, organizational features, functional capacity, pricing and finance, regulatory and accountability mechanisms, information, research and technological capabilities. The indicators of effectiveness of water administration are given in Table 3.

Table 3 Effectiveness of Water Administration

Indicator	Evaluation
Spatial organization of water administration	Non-response; in terms of administrative divisions; for the hybrid basis; in terms of geographic divisions and hydro-geologic regions; for broad hydro-geologic regions; for river basins
Balance in functional specialization*	Unbalanced/ balanced
Existence of an independent body for price determination/division*	Not exist/exist
Seriousness of budget constraint for water	In terms of judgmental perception.

Indicator	Evaluation
institutions	
Effectiveness of accountability arrangements	In terms of judgmental perception. Within formal water administration: administrative supervision, financial auditing (Public Accounts Committees), work auditing, grievance cells, monitoring procedures for sectoral/regional water allocation, inter-ministerial committees. Outside formal water administration: Local User Groups, NGOs, Local Administration.
Adequacy/relevance of informational base	In terms of judgmental perception. Aspects like which agency keeps the data, how regular is publication of this data, its relevance, adequacy, how is the information flow between irrigation department and research institutes.
Extent of science/technology application in water administration	In terms of judgmental perception.

Source: Saleth and Dinar (1999)
*the aspect found significant on the basis of empirical evidence for explaining the effectiveness of water administration

Institutions can be evaluated through their linkage to the water sector performance. Saleth and Dinar defines water sector performance as being composed of physical, financial performance, economic efficiency and equity performance. The performance variables are summarized in Table 4.

Table 4 Overall performance of water sector

Indicator	Evaluation
Physical performance	In terms of judgmental perception considering: The ability of handling the demand-supply gap; physical state of water infrastructure; the efficiency of conflict resolution in terms of costs; smoothness of water transfers across sectors, regions, users.
Financial performance	In terms of judgmental perception considering: the financial gap between expenditure and cost recovery; the investment gap between the actual and the required investment.
Economic performance	In terms of judgmental perception considering: The pricing gap between water price and supply cost; the incentive gap between water prices and the scarcity value of water.
Equity performance	In terms of judgmental perception considering: Equity between regions, equity between sectors, equity between groups

Source: Saleth and Dinar (1999)

Besides the above, Saleth and Dinar uses the *indicator of progressiveness or the overall adaptive capacity of water institution as a whole,* considering aspect like scope for innovation, adaptive capacity, openness for change and the ability to handle future water challenges. They make this indicator dependent of all the above indicators of components and aspects. Another indicator that is not captured explicitly but used as a constant in the regression, concerns in their interpretation, *the overall socio-economic, political and resource related environment*.

Bandaragoda (2000) offers a slightly modified approach to institutional analysis. He focuses on institutional change, the possibilities of improvement of institutions in a river basin context. He suggests that institutions of water management should be evaluated in the historical context, comparing them with the physical development of the basin. Furthermore those aspects of current policies, laws, organizational arrangements should be identified, which are to be improved. The adequacy and appropriateness of the key components is to be *assessed.*

The components and aspects Bandaragoda (2000) considers are those defined above by Saleth and Dinar. Their adequacy and appropriateness can be evaluated in the following manner. To what extent is the institutional aspect adequate for the current physical system in the basin like soil, climate, topology? Does it match the water availability and quality aspects of the basin? Is it adequate and appropriate for the physical infrastructure, for the existent socio-economic situation, for the current technology and for the current performance level?

Another possibility of evaluation could be based on North's (1990) claim: together with technology, institutions determine the production and transformation costs. Therefore institutional performance could be approached in a way that the lower transaction costs show a better institutional performance. In order to achieve lower transaction costs it is essential that the formal institutions build on the informal institutions existent already with respect to the management of natural resources. This way the monitoring, enforcement and other costs can be significantly reduced.

Indicators of Informal Institutions

Ostrom (1994) talks about the conditions common-pool resource (CPR) institutions have to fulfill in order to exist for a long time and to be efficient. These conditions can be valid for formal institutions as well, but we include them into the informal institutional heading because of their self-governance characteristic???. Moreover there is one condition that underlines the informal nature of these institutions, that of the recognition of the right of self-organization by external governamental authorities. The conditions we present are indicators in a sense that their existence shows a viable institution, while their absence underlines non-performance.

The conditions of Ostrom are listed bellow.

1) Clearly defined boundaries for both the individuals/ households to withdraw resource units from CPR and for the CPR itself.
2) The appropriation rules should be related to local conditions: they can restrict the time, technology, place or quantity of resource units based on the local aspects.
3) Most individuals influenced by the rules of operation can participate in modifying these rules.
4) The monitoring, the auditing of CPR conditions and that of the behavior of appropriators, should be accountable to the appropriators, and even appropriators can perform them. This is a low cost exercise, since observing the behavior of the other appropriators in a small community is relatively easy and at the same time it leads also to information transparency, by obtaining information on compliance rate.
5) Those appropriators who violate the operational rules receive graduate sanctions from the appropriators and/or from the officials accountable to the appropriators.
6) Appropriators and officials have rapid access to conflict solving in the low-cost, local setting.
7) External governmental authorities do not challenge the rights of appropriators to create their own institutions.

If these preconditions exist, the CPR institutions contribute to the lowering of the transaction costs, since the time and costs allocated to monitoring, enforcement, and to obtaining information are all lower than in a formal institutional setting. Therefore the formal institutions should rely on the informal arrangements, provide them the framework to function and only interfere when necessary.

A more applicable, more operational method than the conditions presented above is the empirical evaluation of small-town water supply management done by GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) (1996) for the assessment of water supply systems in the Volta Region of Ghana. This method uses the following indicators: water supply situation, sustainability and external factors. Each indicator has scores for evaluation of institutional performance.

The *water supply situation indicator* assesses the extent to which the community needs an improved water supply, and how much preparation and capacity it has to improve the water supply by itself. Therefore the indicator is composed of aspects like: need; responsibility; sense of ownership of the water supply facility; willingness to pay for an improved water supply; ability to pay on the basis of the average income; and extent of participation in the past in initiation and implementation of water supply projects. This indicator has a weight of 45% of the total score.

The *sustainability indicator* comprises those indicators which show the community's capacity of planning, organizing and managing the activities in a sustainable manner. This indicator represents 40% of the score grid. The indicator measures the following aspects: the number, variety and effectiveness of community organizations; the extent of community leadership, unity and coherence; the extent of independent organization of women groups and their planning development efforts; the extent to which the community has already development experience in any sector, those without outside assistance and those initiated

from outside the community; development potential, measured by the extent and variety of commercial activities, and the existence and variety of skills within a community.

Finally, the *external factors indicator* considers the external factors that may increase or diminish the importance of a community. This indicator represents 10% of the score. It comprises: the political status, evaluated based on aspects of being a district capital/not, home town of an important politician or not and the communities' interest in having a state agency, therefore a formal organization for water supply.

We believe that the GTZ methodology can indirectly assess the *level of satisfaction of the population*. This aspect is important in order to analyze efficiently the institutional performance in the **transition process** of the water system towards the water market. The formal indicators methodology can be efficient in the analysis of institutional performance based on official data, but it is not appropriate for measuring the satisfaction level of the communities, their capacity of self-organization and their ability to adopt, to change. For this purposes the informal indicators appear to be more adequate. Therefore, the best way to assess institutional performance is to combine both methodologies.

Case Studies: Institutional Performance in the Irrigation Sector

In our analysis we concentrate on the case of Uzbekistan and Ghana. Although the water sector concerns the overall consumptive uses of water (like irrigation, domestic consumption) as well as the non-consumptive ones (industrial water use, power generation, navigation, ecological water needs), we consider only the aspects of the irrigation sector for the case study. Moreover, in spite of the fact that institutional performance at the international level is important in the studied countries, we focus only on the national, regional and local characteristics.

When evaluating the performance of the institutions, we rely mainly on the formal indicators described in the previous section, based on the methodology of Saleth and Dinar (1999). Therefore we focus on the efficiency of water law, water policy and water administration as well as water sector performance in Uzbekistan and Ghana. Saleth and Dinar evaluates these indicators based on the questionnaires filled out by water specialists of the studied countries. We will instead use the information available in the literature.

We are not going to use the informal indicators from the GTZ methodology, because their application requires information on the community level which we do not have. However, we believe that these informal indicators are very important, and they should be included in a comprehensive analysis.

Uzbekistan

Uzbekistan is located in Central Asia; it is bordered by Afghanistan, Turkmenistan, Kazakhstan, Kyrgyz Republic and Tajikistan. Agriculture is a major activity in the country. It contributes 33% to the GDP. Because of the continental, arid climate, irrigation plays an important role in agriculture (World Factbook a, 2002).

During the Soviet suppression the intensive production of cotton with the excessive use of agrochemicals lead to the contamination of soils. Meanwhile irrigation decreased the water resources; the water level of the Aral Sea and that of the rivers dropped. Following the independence in 1991, the government of Uzbekistan has tried to maintain the command economy with subsidies and control of production and prices (World Factbook a, 2002). The public sector continued to dominate agriculture, too, leading to lack of incentives to improve productivity in this sector. In addition, the deteriorating drainage and irrigation infrastructure and, as a consequence, soil salinization has lead to the un-sustainability of irrigated agriculture (World Bank 2002).

The two main rivers supplying irrigation with water are Amu-darya and Syr-darya. They are both trans-boundary rivers[1], the water distributed from them causing conflict at international and national level. Since the independence, there has been some progress in the improvement of water management of these rivers. During the Soviet period the water resources were divided between the five Central Asian Republics on the basis of master? plans for water resources development in the Amu-Darya (1987) and Syr-Darya (1984) basins. The Interstate Commission for Water Coordination (ICWC) was established in 1992. According to the decision of Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan, ICWC was included in the International Fund for Saving the Aral Sea in 1993. Progress was registered also on national level. In 1993 a new water law was adopted. In 1996 the Ministry of Water Resources and that of Agriculture have merged, and the Water Resources Commission was formed (FAO a, 1997).

Organizational Structure

The structure of water management is presented in Appendix 1. Although we do not treat the aspects of international organizations in detail, we show the international part of water management scheme, too. The International Fund for Saving the Aral Sea is on the highest level, under which ICWC is placed. The executive bodies of ICWC are the River Basin Authorities (BWOs) for Amu-Darya and Syr-Darya and the Scientific Information Center ICWC (SIC ICWC). The BWOs are responsible for the planning and managing the water flow schedules and distribution to what level. SIC ICWC is an information and analytical body, which develops methods of perspective development, improvement of water management and ecological situation in the basin. At the lowest level of the structure the department of irrigation and drainage system can be found (UPRADIK) (SIC-ICWC, 2002).or farms

[1] Water resources are national and trans-boundary. National water resources include flow of the local rivers, underground and return water formed within one country. Trans-boundary water resources are those (river, underground, return) located on the territory of two or more countries, or the deposits connected hydraulically with trans-boundary rivers, and also resources of artificial/anthropogenic reservoirs.

The water management of the surface water on the national level is represented by the Ministry of Agriculture and Water Management (MAWM). The Water Resources Management (WRM), a department of MAWM, is in charge of water resources research, planning, development and distribution. It also deals with the construction, operation, maintenance of the irrigation and drainage networks at the inter-farm level (FAO a, 1997). On oblast, or province level, the department of water management (ODWM) manages the water objects, like canals and reservoirs of inter-district purpose. The *rayon* department of water management (RDWM) regulates the activities of agricultural enterprises and other water users on a district level. Rayons are also responsible for canals and water management.

Planning and realizing the water use is done by centralizing the information on water needs from the grass-root level, and aggregating it on the different steps of hierarchy till the MAWM. Thus MAWM obtains the information about the total needs in water in the country. Furthermore, based on the water limits from the trans-boundary resources and prognosis of water availability from own resources, the MAWM establishes water limits in the oblasts and the sources to cover them. ODWMs and RDWMs, in turn, decide on the water limits in *rayon*s and at water users, respectively. Water limits, are generally less than the required and they are established based on the principle of equal water availability (MAWM, 2000).

The above description underlines the centralized nature of water management. The water management institutions are predominantly formal, due to the Soviet inheritance, leaving no much space for norms of behaviour, informal rules that could smooth the distribution of water at a local level. Following Saleth and Dinar (1999), we will analyse in what follows the efficiency of water law, water policy, water administration and water sector performance.

Water Law

In evaluating the water law of Uzbekistan we rely on the law of "Water and Water Use" (Republic of Uzbekistan, 1993). This law contains provisions regarding the regulation of

water relations, rational utilization of water for people's need and the economy, protection of water from pollution and exhaustion, improvement of the state of water facilities. It also refers to the protection of the rights of enterprises, institutions and organizations of *dekhan* (peasant) farms and citizens in the sphere of water relation.

The *legal treatment of water and related resources* is biased towards consumptive use and within it to population drinking water needs (Republic of Uzbekistan, 1993, Article 25). The law does not explicitly discriminate between the different sectors. In Uzbekistan the *format of water rights* is state ownership. The regulation of water relations is accredited under the authority of the Supreme Council of Uzbekistan, under which the Cabinet of Ministers can be found, and at local level the local authority and management bodies are positioned (Republic of Uzbekistan, 1993, Article 5-7). The *conflict resolution provision* is composed of multiple arrangements, but the evaluation of its effectiveness needs further information (Republic of Uzbekistan, 1993, Chapter 23).

Accountability provisions are explicitly stated for users (Republic of Uzbekistan, 1993, Chapter 27-28). The district water branch representatives examine the water use periodically and they record if actual farm water supply corresponds to the established limits. They also verify the state of the field water discharge and irrigation network water discharge. Based on the precedent cases of similar violations they inflict sanctions on the heads of the farms or chief specialists usually. On account of exceeding the limit of water supply, the water inspection of the MAWM has the right to impose fines (MAWM, 2000).

There is no mention with respect to *private sector participation* (Republic of Uzbekistan, 1993). The existing legislation does not cover the new details related to the emerging private users in Uzbekistan. More detailed assessment of the relationships is needed with regard to the peculiarities of different farms. Legal support should be enforced with respect to the economic relation between farms and water supplying bodies (Saifulin et al, 1998).

In the water law there is a certain extent of *decentralization* in the sense that public associations, collectives and individuals are invited to participate in the implementation of arrangements related to the use and protection of water (Republic of Uzbekistan, 1993, Article 10).

Water Policy

The *use priority* of Uzbekistan regarding water is irrigation. Due the climate condition of Uzbekistan, agriculture is almost totally dependent on it. The strategy of the government is to move away form agriculture towards industrialization (IMF Country Report, 2000). Therefore it is likely that the irrigation will have a decrease in significance in the future, and water use will be biased toward industrial use. The *projects are selected* based on ecological *criteria*, which in Saleth and Dinar's classification are second best alternatives as compared to multiple selection criteria. The installation of new projects must be approved by the competent organ (energy, nature protection, water economy). They must ensure the minimum flow, the prevention of pollution, water contamination and exhaustion, and the prevention of the harmful effects of water (Republic of Uzbekistan, 1993, Article 14-16).

The *cost recovery* is between full subsidy and a partial one, since the farmers are not charged for irrigation water, but in 1995 a land tax was introduced. The amount payable depends on irrigation and land quality, which is calculated by province on the basis of a soil fertility parameter. In the south of the country, for example the tax varies between $US 1.1 and 11.2/ha (FAO b, 1997).

The *participation of private sector* is insignificant. There are no private irrigation schemes and each large scheme is supervised by a state agency. District water management agencies control one or more smaller schemes (FAO b, 1997). Since 2000 the Uzbek government started to transfer irrigation schemes to local users (Wegerich, 2000). In the future there will be a tendency of increasing private sector participation to a larger extent, due to the need for improvement of the irrigation infrastructure.

In the water law there is a mention about the importance for local authority in the decision making process regarding the viability of the installation of the new projects. This can be considered as a certain level of *decentralization*: "Projects of construction of enterprises, structures and other objects which influence the conditions of water is coordinated with the local authority and management bodies, water economy organs, geology and mineral departments and other bodies in accordance with the legislation" (Article 14). Another shortcoming of the policy is that there is virtually no *user's participation* in the management of irrigation and drainage (World Bank, 2002).

There are inefficient *linkages between water policy and other policies*. Different ministries and different agencies are responsible for the various uses of water. Therefore the water policy is influenced by the environmental, forestry, health, municipal, agricultural and hydrological and other policies (Saifulin et al, 1998). However, because of the lack of coordination between the different water management organizations, the linkages with other policies are inefficient and generate conflicts.

Uzbekistan needs a water policy that will effectuate substantial changes in the irrigation sector, like designing a more rational cost recovery system, investing in infrastructure, strengthening the involvement of local communities in the rational use of water. The law adopted in 1993 provides a framework for the implementation of the policy. It ensures at state, national, regional and local level the state management and control in the sphere of water use and protection. Therefore we can say that the water law suits more or less the needs of the policy and therefore there is a *linkage between water law and water policy*.

Water Administration

The *spatial organization of water administration* has a wide range, comprising all the categories included by Saleth and Dinar. On the international side there is a river basin administration, which indicates good performance, while on the national side water

management is organized in terms of administrative divisions. Therefore the spatial organization is usually overlapping. Natural vs administrative boundaries

There is a *balance in functional specialization* among the different executory agencies. The control over utilization and protection of water includes provisions of observance by all Ministries, State Committees and Departments. Public association, collectives and citizens are also urged to help state organs to materialize the measures on rational utilization of water. This structure requires a high cost of monitoring. Furthermore, there is *no independent body* for establishing the water price (Saifulin et al, 1998).

There is not enough funding for the activities of the water administration. The institutional capacity is limited for the planning, design and operation of the irrigation and drainage systems. The organizations once responsible for development of water, irrigation and drainage system have lost a large part of their technical staff (World Bank, 2002). Moreover water administration related jobs are not attractive for the elite of Uzbekistan. In 1998 for example seven out of the 10 students of Tashkent Institute of Engineers for Irrigation and Agricultural Mechanization, the country's largest water education Institute, chose not water related works. The reason for this lays in the reluctance of young people to adapt to the rigid administrative system, not changed since the Soviet times. They cannot promote easily and they are usually hindered in their research by the old (AUSWRD, 1998).

Within the agencies managing different aspects of water use, there is a considerable duplication of efforts because of the lack of co-ordination and information exchange between these institutions (AUSWRD, 1998). Therefore the *information flow* is also not efficient. The *application of science* within the water administration is positively influenced by SIC ICWC, who is information and analytical body, having executive function under the ICWC. SIC ICWC is engaged in research aimed at improving water management.

Water Sector Performance

As mentioned above, we consider only the irrigation sector in more detail. The first aspect of *physical performance* of the irrigation sector, water infrastructure has a bad state. Uzbekistan has one of the most complex irrigation systems in the world. During the Soviet governance, large investments were made in construction, reconstruction and in the maintenance of the all system. A large part of this hydraulic, irrigation and drainage infrastructure developed in 1960s and 1970s are at the end of their useful life. As a consequence the water losses along the distance between the source and the irrigated field were 63 percent in 1994 (FAO b, 1997). In many cases the supply canals (81 percent) have been unlined (without concrete), more than half of the canals are permanent and 26 percent are temporary field canals, all these leading to the loss of water (EC-IFAS, 1999). There are significant differences between old and new irrigated areas. The new ones have been developed since 1960 with lined canals, pipes and flumes in the on-farm network, and a subsurface drainage system, which together enable an efficiency of 75-78%. Investment is needed for the improvement of the old irrigated areas.

Another sign of lack of physical performance is the gap between demand and supply, which was estimated to be 10-20% for 1994 (FAO b, 1997). The smoothness of water transfers and conflict resolutions efficiency is not adequate. Each province receives its share from the common water quota for Uzbekistan. Water experts, agronomists and politicians in Khorezm and Karakalpakstan (downstream of Amudarya river) say that the provinces further upstream – Surkhandarya, Navoi and Bukhara – take more water than they are entitled to??. The official statistics confirm this: upstream provinces regularly received 50-60 percent of their allotted quotas whereas Khorezm received only 6 to 8 per cent and Karakalpakstan no more than 7 per cent. Nine out of fifteen districts in Karakalpakstan have not received any water for the last two years. This is a proof of lack of *equity performance*, too (ICG, 2002).

There are insufficient *economic incentives and financial resources* to improve the irrigation system. In the last five years only 40% of the necessary money for irrigation infrastructure was allocated from the budget. In the same time water charges are low and are acquired as a part of the land tax (World Bank, 2002). Operation and maintenance charges (O&M) are

covered by the government for kolkhoz and sovkhoz and by farmers when they are leased land, although the government heavily subsidizes them (FAO b, 1997).

The *economic performance* is poor. The water tax charged from the farmers is 0,11 soum per cubic m while the real price of the water is 0,9 soum per cubic m. This tax is only about 1 percent of the total farming cost, therefore we witness also an incentive gap between the water price and the scarcity value of water (Wegerich, 2000).

The *equity performance* of the water sector is not adequate, because the down-stream users get less water than the upstream ones. The conflicts with respect to water division take place in connection with the unequal water availability. In the downstream of the rivers, the scarcity of water resources implies a further unequal distribution of water and as a consequence, problems at the grass-root level (Wegerich, 2000).

The above analysis points out the inefficiency of the water management institutions, reflected in the shortcomings of the water law, policy and administration aspects. The water sector performance is also weak, its physical and financial performance is low. Investments are needed to improve the infrastructure, for this private sector participation should be increased.

Ghana

Ghana is situated on the West Coast of Africa and it is bordered by Cote d'Ivoire, Republic of Togo, Burkina Faso and the Atlantic Ocean. The independence of Ghana was proclaimed in 1957. The agricultural sector is the dominant sector in the Ghanaian economy and in 1999 it contributed 42 percent to the GDP (UNDP, 2001). The main source of irrigation is a trans-boundary river, the Volta, which is a source of conflict among Ghana and Benin, Burkina Faso, Cote D'Ivoire, Togo and Mali. The Bia and Tano river basins are the causes of conflict between Ghana and Cote d'Ivoire (MWH, 1998).

Until the present, Ghana did not progress in making formal agreements with any of her riparian neighbors regarding water rights. An inter-state body should be created that would

involve the riparian countries through an irrevocable commitment to deal with all aspects that concern trans-boundary water use. They should work out a mutually advantageous scheme for water conservation, for the preservation and protection of the trans-boundary rivers. Because of the different weight of the sectors for each of the riparian states, they should design common strategies for those projects which involve common water resources (MWH, 1998).

On the national level Ghana has advanced with respect to institutions of water management. In the early 1990s the Government of Ghana initiated the reform of the water sector in order to make it responsive to the needs of the population. The measures taken by the Government have included:

- Public Utilities Regulatory Commission (PURC) was established in 1997;
- Water Resources Commission has been established (WRC) ;
- Rural water has been separated from urban water supply, and the responsibility of rural water management has been transferred to the district assemblies for community management ;
- Private Sector Participation in Urban Water has been introduced in order to improve efficiency and increase access to water supply (Trade Partners UK, 2001).

Organizational Structure

The current water management structure is presented in Appendix 2. At the national level the water management function is performed by the Ministry of Works and Housing (MWH), under which the WRC and the Volta River Authority (VRA) can be found. Although the main objective of the MWH is housings and works, it also has a task related to water management. More precisely it has to ensure the efficient management of all water resources, increase the access to potable water, and provide adequate sewerage disposal and drainage (MWH, 2000). Another Ministry involved indirectly in water management is the Ministry of Agriculture (MoFA), under which at the regional level the Ghana Irrigation Development Authority (GIDA) is positioned.

On the national level there is an independent body - PURC, not responsible to any Ministry, with the task of overseeing and regulating the provision of utility services in the country, including water. More specifically PURC has to provide guidelines for the rates charged for the provision of utility services, examine and approve water and electricity rates, protect the interest of consumer and providers of utility services, monitor and enforce standards of performance for provision of utility services, investigate complaints and settle disputes between consumers and public utilities (PURC a, 1999).

The WRC was created in 1996 because of the need for a body, which would perform the duties of management, regulation and control of water resources (MWH, 1998). The PURC is an "auditor" of the WRC's activities. The power company VRA was established in 1961. Currently it is responsible for the operation of two hydro-electric plants, for the distribution of electricity. Moreover it has the tasks of civil governance in the Akosombo township and the running of the health service for communities around the Volta lake (KNSEA, 2002).

At the regional level the Ghana Irrigation Development Authority (GIDA) and the Ghana Water Company Ltd (GWCLtd) are positioned. GIDA is the exclusive agency involved in the management of the irrigated lands. It operates and maintains the irrigation system. GIDA belongs to MoFA, which underlines that the water management functions are dispersed between ministries (FAO, 1995). The GWCLtd (formerly the Ghana Water Supply Company - GWSC) was established in 1965 to be responsible for the provision of potable water in the urban and rural areas (Trade Partners UK, 2001).

At the local level the cooperatives and the Water Management Board (WMB) are situated. The participants of the WMB are the official representatives of GIDA, of the Cooperatives and the village chiefs. The WMB decides what to grow, it distributes the land for farmers, decides on the amount of water allocated to the farmers. At the same time the "traditional" authorities and institutions have a significant role at the local level in water allocation and management. The chiefs of the lands create and follow their own rules with respect to the allocation of water rights.

The above organizational structure shows that in Ghana there is not a well organized formal structure of water management. Two ministries are responsible for different aspects of water use, and coordinate different agencies, sometimes having conflicting interests. Informal institutions, the local rules-in-use are strong, and the authorities leave space for self-organization. In what follows we attempt to analyze the formal institutions of Ghana, following Saleth and Dinar's methodology.

Water Law

For evaluating the water law of Ghana we rely mainly on Act 522 of the WRC. There is no mention of any *differential legal treatment of water and related resources*. The water resources of Ghana are in public property (Republic of Ghana, 1996, Article 12). The WRC can grant the *water right* to any person. The WRC first makes investigations and consults the inhabitants of the area if it considers necessary. This aspect shows a degree of *decentralization*. The water right granting is published in the Gazette and objection can be handed in within 3 months' time (Republic of Ghana, 1996, Article 16). Public purposes have *priority*: the WRC can any time withdraw the water rights when it considers that the resource is needed in public interest, while the holder of the water rights is entitled to compensation (Republic of Ghana, 1996, Article 20-21). This aspect hinders private participation, since there is no security for user rights.

There are *provisions for conflict resolution* in the case when an individual exercises activities endangering the environment and public health. The WRC will give an enforcement notice to the respective person, to prevent and stop this activity. The effectiveness of conflict resolution provisions is still a question. We believe that informal institutions play a significant role in conflict resolution. The local chiefs create their own rules-in-use and they enforce them.

The *provision for accountability* in case the person acts contrary to the mentioned enforcement notice says that the respective person is liable to a certain amount of fine and/or

to imprisonment up to one year. If he continues the offence after conviction, he is liable for a further daily fine (Republic Ghana, 1996, Article 15). Moreover, the person polluting or altering the flow of any water resource beyond the level prescribed by the Environmental Agency is liable to a certain amount of fine and/or imprisonment up to two years (Republic of Ghana, 1996, Article 24).

Water Policy

The *use priority* concerns the industrial sector water uses. The general policy of the government is to increase the importance of industry in the economy. Therefore the share of agriculture, industry and services in GDP of 42%, 15% and 46% in 1993 is projected to change to 18%, 36% and 49% respectively in 2020 (MWH, 1998).

Ghana is implementing a *decentralisation policy* in order to involve the district level in the largest part of the planning. This involves some 110 district assemblies, which have the mandate to initiate the formulation of their own plans and development programmes, taking into consideration their needs and the available resources. The plans regard the data on natural and human resources as well (Allotey et al, 1999).

The *private sector promoting policy* is likely to have the best prospects with respect to the activities that could be contracted-out or outsourced. The benefits of the direct control in the case of the core activities (operation of assets) are clear; while for peripheral activities (security, building maintenance) the benefits of private sector involvement are likely to be greater (MWH, 1998).

The *users' participation* is stimulated through PURC, which has among its nine members the representatives of domestic consumers as well as experts in various aspects of the WRC's work (PURC b, 1999).

The main problem in the water policy of Ghana is that there are no efficient *linkages to other policies*. Ghana lacks an overall water policy for tariffs, in the form of strategies, national

water master plans, mechanisms for inter-sectoral coordination or conflict resolution. As already shown in the organizational structure, different agencies are responsible for each category of water use, each of them taking their own policy decisions related to water resources without coordinating of their actions with the others. The sectoral and fragmentation aspects make water resources management inefficient. An adequate combination of institutional, policy, economic, financial and regulatory instruments is needed to plan, coordinate and manage water use (MWH, 1998).

There is a *linkage between water law and water policy*. The water law of Ghana offers institutional support for the implementation of water policy. The WRC and PURC are organizations that ensure water rights and needs of the population.

The MWH has expressed its view about the water policy orientation in the 1998 report. For efficient water management, they claim that the human, technical, financial, organizational and institutional capacity needs to be strengthened. The WRC should carry out the planning function in close collaboration with political bodies at national, regional, district and local level. The water sector plans should be developed by the political bodies at district level, and aggregated at regional as well as at national level. Institutional capacity must be developed at all levels as well as among staff, communities and individuals, in order to ensure that the strategy for water resources management is properly implemented. Furthermore, there is a need for capacity-building in the information, regulatory, development and the international waters areas (MWH, 1998).

The policy with respect to water pricing has to change. It should follow the principles: user pays; it should be socially acceptable to the different interest groups in the water sector; pricing should contribute to economically viable and environmentally sustainable development and equitable distribution of water; there should be stakeholder participation in all important decision making (MWH, 1998).

Water Administration

There is an *unbalance in the functional specialization* already at the national level, which is a source of conflict. MWC does not have the main objective of water management but in the same time it controls the activity of the Commission in charge of the water resources. A positive feature is that there is an independent body for price determination. The PURC is a specific institution that decides the water price in Ghana (Republic of Ghana, 1997, Section 16).

The *accountability arrangements* within the formal administration refer to financial auditing of the WRC every year (Republic of Ghana, 1996, Article 26). The WRC has to provide every year an annual report to the Minister, who will further submit it to the Parliament (Republic of Ghana, 1996, Article 27). The WRC has the right to obtain information in order to exercise its functions efficiently. The WRC has the right to audit the works constructed and in process of construction.

In general the administration and in particular the WRC faces some major constraints. These include difficulties in securing permanent office accommodation, the inadequate current staffing level and inadequate funding to enable the WRC to function efficiently. Moreover, because of the arbitrary ceiling imposed on the WRC's budget proposals, *funding constraints* are present (PURC b, 1999).

Science/technology is applied to a certain extent in water administration. In the composition of WRC there are representants of research institutions like the Water Resource Research Institute, the Meteorological Service and Environmental Protection Agency (Republic of Ghana, 1996, Article 3).

In general *administrative performance* is weak, mainly due to the predominance of public sector. It is recognised generally public sector institutions have weak institutional capacity and inadequate incentive structure at agency levels and weak leadership at administrative levels. Most public service institutions also lack expertise in critical areas such as policy analysis, planning, budgeting and accounting (Allotey et al, 1999).

Water Sector Performance

The water sector shows a poor *physical performance*. Between 1980 and 1990, the level of water provision services has declined substantially. That was due to the deteriorating infrastructure. More than half of the supplied water was unaccounted for (that is from leakage or theft), because of poor billing and revenue collection.

In addition, population growth and lack of capital investment for accelerated development further widened the gap between the demand and supply of potable water. Therefore a large number of people did not have access to potable water and the price of the water has increased, causing difficulties for the poorer part of the population in paying for it. The physical performance of the system requires serious improvement.

The *financial performance* of the water provision company was poor. At the end of 2000, the Ghana Water Company Limited owed about $400 million in debts and there was still more than 50% unaccounted water.

Therefore there is an ardent need for private sector participation. The government through encouraging private sector promotion aims at increasing access to water supply, improving water sector management, reducing the financial burden on the Government and ensuring sustainability of the sector through cost recovery, affordability and financial viability. (Tradepartners UK, 2002)

Discussion

As we can see from the above analysis, in Uzbekistan there is a strong state participation, while in Ghana there is a combination between the presence of state and civil society. In the last years there have been changes in both countries, Uzbekistan and Ghana adopting a new law and creating their Water Resource Commissions, which is meant to undertake a more efficient water management. In Uzbekistan progress has been registered also with respect to the merger of two different ministries responsible for different aspects of water use, while in Ghana the establishment of an independent body, PURC shows a better decentralization and

more efficient auditing. The latter function in Uzbekistan is fulfilled by the international bodies coordinating with the ministry.

In Uzbekistan the formal water institutions are better organized, they have an international division which is meant to solve the conflicts between the riparian states, while in Ghana this aspect is missing. In Ghana under the MWH there is the WRC, which has the core function of water management, but its objectives are sometimes in conflict with that of the supervising Ministry, who has other priorities. An advantage of Ghana's organizational structure is the existence of PURC, who monitors the water management activities and provides conflict resolutions. The whole structure in Ghana is more decentralized than in Uzbekistan, the Ministries having only the role of supervision of different agencies and Commissions, like MoFA supervising GIDA respectivelly MWH the WRC.

The water law in Uzbekistan and Ghana specifies that the water is a state property. In Uzbekistan there are explicit conflict resolution provisions, multiple arrangements, while in Ghana there is no clear specification about the mechanism of conflict resolution. Here informal conflict resolution provisions at the community level play an important role. There is no efficient legal scope for private sector participation while in both countries there is a tendency of decentralization within the law.

The water policy of the two countries shows similar orientation. While currently agriculture plays the central role in the two economies, the industrial sector will receive a particular attention in the future. This aspect is important for the orientation of new investments in the infrastructure of water system. Therefore, the use priority of water as well as the criteria of project selection may be changed. The private sector promotion policy is weak in the studied cases, but in the future more private involvement is planned. There is a tendency of decentralization in the policy, too. User participation is not promoted in Uzbekistan while it is encouraged in Ghana. The latter may be due to the fact that the informal institutions play an important role in the water management of Ghana. The linkages of water policy to other policies are inefficient in both cases.

The water administration is weak in the two countries. In Uzbekistan there is a more efficient spatial organization of the water administration, having a river basin focus. In Ghana not only this aspect is missing, but also the functions of the different organs overlap, causing conflict and inefficiency. Uzbekistan has a more equilibrated functional specialization than Ghana. However, in the latter there are advantages related to the existence of an independent body determining the price of water, which in Uzbekistan does not exist. In the two countries the performance of water administration is hindered by the inadequate staffing, by budget constraints and sluggish information flows between different organs. A positive feature is that research organizations are involved in water management.

The water sector performance underlines the lack of efficiency of institutions. The irrigation systems are deteriorating, the supply-demand gap is wide. There is no equity performance in Uzbekistan and the economic and financial performance is weak in both countries.

The above indicators could capture the most important differences and similarities with respect to the institutional performance of water management in the studied countries. They underline that the institutions of water management in Uzbekistan and Ghana in a transition process towards some degree of privatization. The government in the two cases shows orientation towards more involvement of the private sector, but this tendency is rather weak.

The most important advantage of Ghana consists in the relatively large freedom given to informal institutions. This has consequences also regarding the structure of formal institutions. The higher degree of involvement of the communities in water management shows a greater flexibility to change, a greater adaptability.

Conclusion

In our study we attempted to capture the most important indicators that could evaluate institutional performance in water management. In our focus we concentrated on those

indicators that could be "measured", more precisely the operational ones. We identified the most important formal indicators guided by the paper of Saleth and Dinar, while at informal indicators we relied mostly on the GTZ methodology.

We applied the formal indicators on the cases of Uzbekistan and Ghana, two countries with different water management organization but similar problems with respect to the performance of institutions of water management. The indicators could capture the most important efficiency problems of formal institutions. They pointed out the necessity of orientation towards the water market, in order to increase the institutional performance of water management on the levels of law, policy, administration and water sector performance. Therefore we conclude that Saleth and Dinar's methodology is efficient for analyzing the formal institutions and it is applicable.

Besides the formal institutions, the informal institutions need to be analyzed, too, because, without this aspect, a comprehensive evaluation of overall institutional performance is not possible. Assessing the performance of informal institutions would be important for the identification of the assets the formal institutions can build upon. Combining the formal institutions with the informal ones will increase efficiency and lower the costs related to monitoring and enforcement.

We believe that the combination of formal and informal indicators we have presented can capture the most important aspects of institutional performance. Further research is needed to identify other indicators that could complete the evaluation, assess their relative performance and eliminate those, which do not capture significant aspects.

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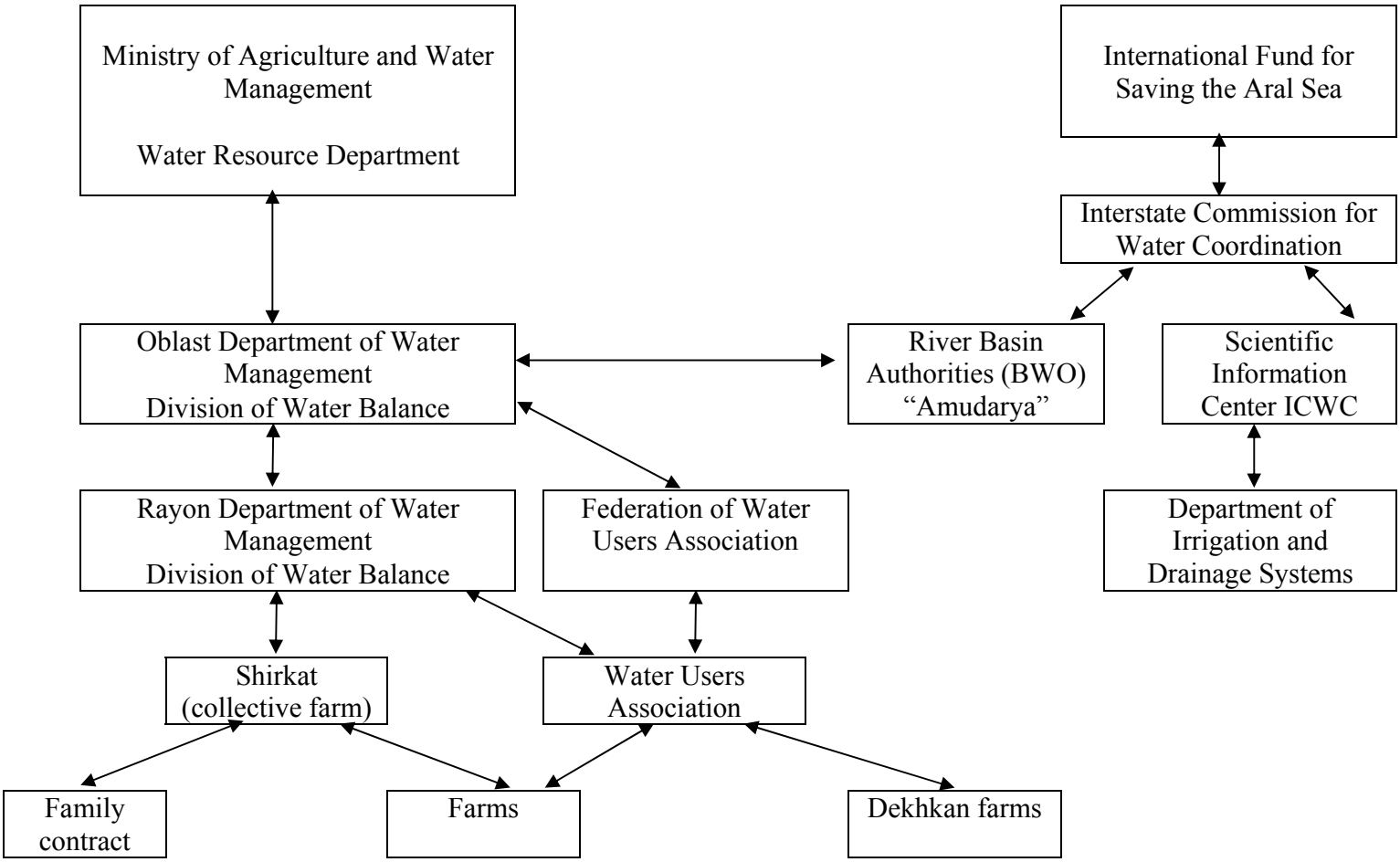
Appendix 1. Water management system in Uzbekistan, Amu-Darya river basin



Appendix 2. Water management system in Ghana