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Water Governance in the Kyrgyz Agricultural Sector:

On its Way to Integrated Water Resource Management?

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German Development Institute (DIE)

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Abbreviations

ALRF	Agricultural Land Redistribution Fund
ADB	Asian Development Bank
CAMP	Central Asian Mountain Partnership
CASE	Center for Social and Economic Research
DWM	Department of Water Management
DWU	Drinking Water Union
GA	General assembly (of WUAs)
GDP	Gross domestic product
GWP	Global Water Partnership
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross domestic product
ICWC	Interstate Coordination Water Commission of Central Asia
ISF	Irrigation service fee
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
MAWMPI	Ministry of Agriculture, Water Management and Processing Industry
MEES	Ministry of Ecology and Emergency Situations
NGO	Non-governmental organization
O&M	Operation and maintenance
RSWR	Renewable surface water resources
SDC	Swiss Development Cooperation
TES	Technical Extension Service
UNECE	United Nations Economic Commission for Europe
UOS	Upravleniye oroshaemyh system
USAID	United States Agency for International Development
WSU	WUA Support Unit
WUA	Water User Association

Preface

The present study on 'Water governance in the Kyrgyz agricultural sector' was conducted within the framework of the postgraduate training course at the German Development Institute (DIE) from November 2004 to Mai 2005. The team consisted of five postgraduate students with various academic backgrounds.

Notwithstanding the political events around the 24th March and the overthrow of President Akaev and his government, the field research was for the most part completed as planned. Nevertheless, the workshop originally planned to present the main findings to important stakeholders in Bishkek had to be cancelled.

The study benefited hugely from the support and contributions of various persons and organizations. First and foremost, the authors would like to emphasize the contribution of our counterpart, the Center for Social and Economic Research in Kyrgyzstan (CASE), in the preparation and realization of the research. Especially, we would like to stress the commitment of one CASE team member, Aziz Atamanov, who provided valuable organizational support, thematic input, and advice.

We would particularly like to thank our translators Meerim Matkulova and Rinat Kurmankulov. They not only contributed their excellent language skills and organizational talent but also provided valuable insights into Kyrgyz culture and thinking.

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And last but not least, we would like to thank all our interview partners in Kyrgyzstan and Uzbekistan. We would like to thank them for their interest and their patience as well as for the time and insights they shared with us. Most of the findings of this project result from the valuable information they contributed.

Чоң рахмат!

Bonn, December 2005

Summary

In many regions of the world, water problems are on the rise. To prevent conflicts, water allocation and use, and in particular the role of agriculture as a major water user, have become important topics in the development discourse in recent years. With the momentum of several water conferences in the 1990s and in accordance with the paradigm of sustainable development a new model of water management, Integrated Water Resources Management (IWRM), has been developed. With a holistic approach, it tries to include many different key principles: the river basin perspective, integration of economic, ecological, and social aspects, consideration of the principle of subsidiarity, and combination of supply-side measures with demand management.

The present study sheds light on the implementation process of IWRM in a transition country. Based on an analysis of Kyrgyz water governance, the study assesses the status quo as well as the potentials of and obstacles to the realization of the normative framework of IWRM in a transition country. Comparing today's institutional structure of water management with this normative concept, it reveals the most significant gaps between norm and reality, but it also identifies existing progress towards IWRM and provides recommendations on how to further develop Kyrgyz water governance in a direction conforming to IWRM.

For this purpose, the extensive model of IWRM was operationalized, and the components of ecological, sectoral, and regulatory integration were identified as the model's three main pillars. Ecological integration means that IWRM is based on an eco-system approach. It therefore systematically takes into consideration ecological interdependencies such as water quality and quantity issues or water-land interaction. Sectoral integration denotes that economic, ecological, and social externalities of water use are internalized in order to direct water allocation to uses that are most beneficial to society. Inter-temporal trade-offs are also taken into account to ensure that future generations will still be able to satisfy their needs, as enshrined in the principle of sustainable development. Regulatory integration requires decision-making structures to be organized according to the principle of subsidiarity. Decisions should be based on adequate data and combine supply-side measures with demand management, which aims at

prioritizing demands and promoting efficiency of water use.

These three pillars of IWRM were further subdivided into criteria, and these in turn were broken down into subcategories. The result was the development of an IWRM Pyramid which helps to identify achievements of the ongoing reform process as well as further reform needs.

Varying progress on different components of IWRM

The analysis shows that Kyrgyz water management is indeed heading towards IWRM. However, having started no more than ten years ago, reforms are just at the beginning of this probably long and stony pathway. Only the latest stages of reform were explicitly based on the concept of IWRM itself. Yet progress is already considerable compared to most of Kyrgyzstan's neighbors, and it is likely to continue with the implementation of the ambitious new Water Code, which was adopted by Parliament in December 2004. Nevertheless, progress varies considerably with regard to the different components of the IWRM Pyramid. There are aspects of Kyrgyz irrigation management that are clearly more 'on track' vis-à-vis IWRM than others, even though it is difficult to rank each of them precisely.

Most progress has been achieved on the managerial principles of IWRM, i. e. regulatory integration. In particular, decentralization of irrigation management has advanced quickly since the 2002 Law on Water User Associations (WUAs) and the transfer of most tertiary infrastructure to these bottom-up organizations. Subsidiarity seems to be gaining ground, since merged WUAs and – probably – future WUA federations are supposed to take over whole irrigation schemes. This implies the transfer of most competencies from district water departments (*RayVodKhozes*) to end users' organizations, thus rendering the former superfluous in the middle term. Progress on other aspects of regulatory integration is less impressive, but nevertheless notable. Regarding information and communication, many infrastructure rehabilitation projects contain components aiming to improve the measurement of water flow, facilitating the calculation of individual water use. Transferring these tasks from the *RayVodKhozes* to WUAs has improved the collection and aggregation of data on water needs of end users. The former were overburdened by the task of

collecting and processing water applications for each individual land plot that resulted from the land reform. Demand management has also improved thanks to the introduction of volumetric water fees to be paid by end users or WUAs to *RayVodKhozes*. The adaptation of outdated Soviet irrigation norms to current circumstances, albeit in a pilot stage, offers some promising perspectives as well. Finally, most donor-financed rehabilitation projects aim at reducing losses from infrastructure that has fallen into disrepair.

Moderate progress can be observed regarding ecological integration. With the introduction, merging and future federation of WUAs, management structures will be more in line with hydrological boundaries. If the new Water Code is implemented, the future State Water Administration will be organized at national and basin levels, replacing the current province (*oblast*) structure. It remains unclear, however, whether the district (*rayon*) level of water management will be eliminated. For the moment, the *RayVodKhozes* remain the most problematic organizations for the shift from administrative to hydrological units in management structures. Progress on integration of water quality into irrigation management is far from sufficient. Although pollution standards are rather strict, lack of enforcement is obstructing their translation into practice. The consideration given to water-land interaction suffers particularly from the underfunding of drainage facilities and lack of know-how on the part of peasant farmers, who are still struggling to manage their privatized plots in a sustainable manner.

Overall, moderate advances have been made on sectoral integration, although differences within this component are considerable. The least progress has been made in relation to internalization of ecological externalities. The new Water Code does some lip service to nature conservation, but there is no genuine recognition of nature as a legitimate water user in Kyrgyzstan. The picture regarding the integration of social externalities is more ambivalent: While health and gender issues are neglected and local water conflicts continue to pose considerable problems, the continued subsidization of irrigation services, particularly in remote areas, could be interpreted as a measure designed to alleviate rural poverty. However, these subsidies seem to be the result more of a general sensitivity towards raising water fees than of any intention to provide targeted support to the poor. Partly due to the subsidization of irrigation water supply, the picture

regarding the internalization of economic externalities is ambiguous, too. Although water fees have been introduced, and raised several times in recent years, they cover no more than 15 % of real supply costs, contributing to the severe underfunding of irrigation services. In addition, non-agricultural water-using activities are clearly underrepresented in public water administration, preventing a re-allocation of water resources to other, possibly more profitable uses such as tourism.

Reasons for uneven progress

Based on a model of institutional change by Saleth and Dinar, the reasons for uneven progress can be identified in a number of different dimensions.

Objective reasons for change: External reasons for change clearly constitute the main driving forces of Kyrgyz irrigation sector reforms. Two of these external reasons seem to be of particular importance: First, the dismantling of the Soviet Union led to the end of Soviet transfers to the Kyrgyz economy, causing a severe lack of funds for maintaining public infrastructure, as well as to the fragmentation of farm land in the course of post-Soviet land reform. This resulted in a marked deterioration of irrigation infrastructure on the one hand and to a misfit between irrigation management and land ownership patterns on the other. Second, international donors replaced the Soviet Union in providing financial assistance, introducing new thinking in water management and articulating demands for IWRM-inspired irrigation sector reforms.

Political articulation and actual reform program: Since independence, the serious problems besetting the Kyrgyz irrigation sector have provided an enabling environment for externally driven reforms: As the state lacks sufficient funds and an adequate administration to provide irrigation services of satisfactory quality, overall resistance to reforms at the national level is relatively weak. Due to this openness as well as to considerable donor leverage on Kyrgyz policies in general, donors are able to heavily influence the reform program of the Kyrgyz government. This resulted in the launching of IWRM-inspired reforms before any significant mind change had materialized or genuine political demands had been voiced by water users or other Kyrgyz stakeholders. In fact, the political articulation of agricultural water users and their representatives in parliament is mostly limited to resistance to specific donor demands, e. g. raising water fees.

Other veto players are line ministries, which have successfully opposed any consistent concentration of their water-related responsibilities within the new State Water Administration. This political articulation is purely reactive, however, while donors push forward their IWRM-inspired, technocratic reform concepts. The far-reaching initiatives of donors therefore risk being out of touch with the inner-Kyrgyz political arena, complicating efforts to globally reform Kyrgyz water management, as IWRM would require. The newly created institutions are at best weakly embedded in the institutional framework and socio-economic environment.

Donor demands have been met inasmuch as new formal institutions (in the form of legislation and policies) have been established. The related reforms, however, (in the form of organizational rearrangements, shifting competencies, and a new strategic orientation) have only been implemented where they are politically the least problematic and financially the least costly or even profitable for the state. These areas are clustered in the field of regulatory integration: Resistance from *RayVodKhozes* to decentralization is weak because of their sheer inability to manage water supply to the multitude of fragmented private land plots. Farmers generally welcome their empowerment through the introduction of WUAs. Improving water measurement is a technical issue and thus unproblematic as well. In the short run, installing measuring devices turns out to be relatively cheap for the Kyrgyz government, as it is mostly donor-financed. The same goes for rehabilitation projects designed to reduce water losses. Notwithstanding the mounting debt progressively burdening the national budget, donor-financed irrigation projects constitute win-win constellations for Kyrgyz actors in the irrigation sector.

However, one aspect that must be seen as politically sensitive is the objectives of water management, i. e. the field of sectoral integration. Since nature completely lacks voice and ecological concerns are only weakly embedded within the broader societal context, nature conservation is the field most neglected. Cost recovery is the area where donor conditionalities are the strictest. This explains the fact that some progress has been made in this respect.

These mechanisms explain the asymmetries within the reform program. The politically less problematic aspects of IWRM figure prominently in the new Water Code – the reform agenda's current key document – while

others figure less prominently or not at all. In addition, there are inconsistencies between the more programmatic Water Code on the one hand and the legal provisions for its implementation on the other. Instruments for implementation are mostly lacking in the politically more sensitive or financially more costly areas, i. e. regarding aspects of sectoral integration and lack of advocacy.

Institutional change: While the reform program is already biased, implementation of agreed-upon reforms – i. e. the required institutional change itself – is also proving to be difficult. Slow progress mostly results from particular features of current institutions in Kyrgyz irrigation management.

A common problem in implementing irrigation sector reforms continues to be the state administration's lack of enforcement power and capabilities. Although these are key for the success of reforms, they are also challenging to tackle, because they affect most sectors of public authority.

Another reason for the slow pace of institutional change is the important role played by informal institutions and organizations originally not involved in Kyrgyz water management. The newly introduced formal rules (laws and policies), which are not rooted in informal ones, are difficult to implement and enforce. As a result, informal rules derived from behavioral factors tend to be at odds with newly introduced institutions. They exist alongside formal rules, destabilizing the overall system. Thus the involvement of local self-governance organizations (*ayil okmotus*) has an ambiguous character; it stabilizes water management in general, but at the same time it hampers new organizations in improving and fulfilling their tasks independently.

Summing up, the process of institutional change is mostly focused on the establishment of formal institutions, but without giving consideration to informal rules. This results in the coexistence of new water institutions with old and in part contradictory informal rules of water management. In order to avoid dual structures, informal rules need to be taken into account when establishing new ones. Old institutions of water management and other forms of local self-governance organizations should be considered, e. g. when concepts for Audit Commissions or WUA federations are developed and introduced. At the same time, lack of political will and/or enforcement are hampering the implementation of several new formal

institutions, e. g. adherence to the concept of hydrological boundaries as demanded in the law on WUAs.

Behavioral change and mind change: The actual impact of irrigation sector reforms depends on their ability to induce behavioral change in all stakeholders. Evidence on this change with regard to Kyrgyz irrigation farmers varies. Overall water use has decreased during the last years. Yet it is not clear whether this is due to raised awareness and new water-saving irrigation techniques or to more general developments in Kyrgyz agriculture. A fact that clearly hints at behavioral change is the rising willingness of farmers to pay irrigation fees, which indicates a departure from the traditional idea of water as a free good.

However, most positive effects on the performance of the Kyrgyz irrigation sector currently result directly from donor-financed infrastructure projects. The rehabilitation of canals has an immediate positive impact on the quality of irrigation services. It thus supports building confidence in the irrigation management system and encourages behavioral change, e. g. with regard to the willingness to pay water fees.

Nonetheless behavioral change and mind change have not yet reached the higher levels of water administration. So far, the Department of Water Management (DWM) has not come up to its task of developing a vision for the water sector and of strategically shaping water management reforms. Overall, a lack of conceptual implementation of IWRM in both form and content has to be attested. The current path of reform is more reminiscent of patchwork, and there is no clear vision behind it. This applies, for example, for social and ecological externalities as well as for the restructuring of the institutional arrangement, i. e. water management organizations.

Main recommendations

— **Continue efforts to create and strengthen WUAs:** Further decentralization of irrigation management has a high potential for advancing different aspects of IWRM. Notwithstanding their currently manifold shortcomings (underqualified staff, weak organizational setup, etc.), WUAs have a high potential as change agents for realizing many aspects of IWRM, including the currently more neglected ones like water-land interaction. Furthermore, WUAs are forced to

achieve cost recovery for tertiary canal management, and this favors sustainable funding of irrigation services. WUAs (and future WUA federations) are supposed to manage whole hydrological units, preferably replacing the district water management departments (*RayVodKhozes*). They bring water management nearer to end users, thus improving responsiveness to users' needs. In addition, properly functioning WUAs contribute to solving many of the overall problems of the water management sector. These include improved enforcement of rules (e. g. payment of fees, imposition of sanctions for illegal water abstraction, etc.) and enhanced accountability and thus also support mind change at the local level.

Considerable advances have already been achieved in establishing WUAs, and the WUA Support Units (WSU) are now in possession of experienced and qualified staff. Further reforms can capitalize on this asset, as resistance to the decentralization of irrigation management seems to be limited. Besides training for management and staff, further finance for infrastructure rehabilitation should be provided to WUAs. In general, strengthened WUAs are more likely to overcome problems posed by interference by other actors, which is currently impeding the proper implementation of decentralization reforms.

— **Further move towards cost recovery in irrigation management, one that ensures that social safeguard mechanisms are provided for the poorest:** Proper funding of irrigation services is a precondition for advances in most other areas of IWRM: Drainage facilities cannot be maintained if funds are lacking or the profitability of irrigated agriculture suffers from unreliable water supply induced by underfunded infrastructure, and decentralized management structures cannot be expected to prosper if WUA staff is not paid adequate salaries. Since resistance from beneficiaries of subsidized irrigation services to fee increases continues to be great, political efforts have to be concentrated on efforts to convince water users of their long-term interest in better cost recovery. Both WUA fees and irrigation service fees (ISF) should be progressively increased and differentiated in keeping with real supply costs.

Politically, it is difficult to raise WUA fees and ISF, and in the past members of parliament have been very reluctant to tackle this issue. Given the present political situation, this situation is likely to continue, since the new parliamentarians appear to be even more dependent on their constituencies in rural areas. Nevertheless, there is scope

for raising ISF for several reasons. First, in the end these fees were introduced because of massive donor pressure in the past. This pressure by relevant donors like the World Bank continues and there are plans to come up with estimates on real costs of water delivery by the end of 2005. Second, with the introduction of WUAs and their (at least in some areas) growing ability to improve irrigation infrastructure and management, acceptance of fees for water delivery among farmers has increased. Both donor pressure and rising acceptance among farmers make a further increase in fees a realistic option.

Yet initiatives for better cost recovery should not neglect negative social externalities bound up with fee increases. It is, for instance, necessary to provide adequate safeguards for the poorest. Higher and better targeted social assistance from the national budget are desirable options. However, additional cross-subsidization mechanisms via 'social funds' should be created within WUAs in order to further limit risks of social hardship.

— **Implement the new water management structure with a special emphasis on integrating non-agricultural water users:** Key provisions of the new Water Code include reorganization of the water administration in keeping with hydrological units and a clear inter-sectoral orientation of the planned National and Basin Water Councils. At present, the national Department of Water Management (DWM) and its regional branches are conspicuously dominated by agriculture, and this has tended to sideline other uses such as drinking water supply and tourism. Probably, a more balanced representation and real leverage of these two sectors on national and basin water policies could not only promote economic efficiency – based on a possible reallocation of water from agriculture to other uses – but also strengthen the integration of social (human health) and ecological (nature conservation) externalities. This would contribute positively to sectoral integration.

  As initial steps toward implementing the new water administration have shown in the past, this is a task difficult to achieve given the reluctance of most of the agencies involved. The ongoing reorganization of the general political administration should therefore be used as a window of opportunity to shift staff and adjust the water management structure at the same time.

— **Amend the new Water Code, strengthening ecological concerns and introducing a provision on WUA federations:** The new Water

Code is an important legal tool for advancing IWRM in Kyrgyzstan. Nevertheless, it could and should be improved. Ecological concerns, for example, feature prominently only in the general, more programmatic articles. They should also be integrated into the more concrete provisions, adding for example an ecological flow requirement to the provisional water use priorities of basin water use plans. Another shortcoming seems to be that WUA federations are not mentioned in the Code. However, in the future they are to take over the *RayVodKhozes'* tasks of irrigation water supply. This needs to be clarified in the document. To avoid ambiguity, respective provisions should thus be added to the Water Code to improve the internalization of ecological externalities on the one hand and to continue the decentralization of water management on the other.

In particular the introduction of WUA federations appears to be a politically sensitive issue. The greatest reluctance to hand over responsibility to WUA federations is, however, centered not in the *RayVodKhozes*, where staff already plan to become engaged in these federations, but at the national level of administration. To facilitate tasks and support the DWM in fulfilling its original tasks, further measures should therefore be taken to strengthen the DWM's ability to engage in strategic planning.

— **Increase agricultural knowledge among farmers:** Insufficient integration of water-land interaction in local irrigation management endangers the long-term sustainability of water use patterns. Many farmers, particularly in the north, lack knowledge on these issues. Know-how on new farming techniques and best practices in irrigation farming is also limited to a minority of farmers. This undercuts not only the ecological sustainability of agriculture but also its productivity and profitability. Agricultural extension services should thus be encouraged to offer training on these questions to both farmers and WUA staff. Due to their in part public-good character, attendance at these trainings could be subsidized, in particular for poor and inexperienced farmers.

Resume and outlook

IWRM is, in part, on its way in Kyrgyzstan, but realization of a water management in conformity with IWRM has yet to materialize. Significant steps have been taken, and more are set to follow, but these steps have not

been bundled through an underlying overall strategy or vision, and the reason why they have been achieved is mainly that donors pushed the country into them. This in turn is why most IWRM principles are only weakly embedded in other social rules.

Thus far, lack of ownership or mind change for reforms has not been an essential factor. Reforms have concentrated on predominantly technical and managerial issues. A comprehensive adoption of the normative framework of IWRM, a step that has not yet been taken, would require a fundamental rethinking of water management and a shift in societal values. Otherwise chances are slim that it will turn out to be a success. What could be achieved through outside pressure and demands has already been achieved. Developments have come to a point where the initiative for the process now has to pass over to Kyrgyzstan. There are first signs of such a change detectable especially at the local level of Kyrgyz water management, which should be further supported through donors continuing efforts in rehabilitation and awareness raising.

If the pace of reform in Kyrgyz water management is to be sustained, a substantial demand for respective reforms needs to be articulated by Kyrgyz water users and stakeholders themselves. Thus, in the long run, mind change is a necessary condition for continuing moving towards IWRM. Without such change, implementation of IWRM will founder or at least slow down considerably. It is crucial to develop an overall strategy based on the preferences and the commitment of society. As long as this has not happened, further steps towards taking water management reforms in Kyrgyzstan further down the road towards IWRM are unlikely to occur.

It is questionable, though, whether and how both such a strategy and the further overall reform process will be developed and adopted in the future. Donors, the main push factor for water reforms, have not yet shown any major interest in such an undertaking. At least the main players, the World Bank and the Asian Development Bank (ADB), aim for the most part at lopsided approaches that emphasize economic aspects. The same applies for the (former) Kyrgyz government. Donors should continue to underline the importance of IWRM for a functioning and sustainable agricultural sector to the Kyrgyz government and pay higher attention to ecological and social aspects of IWRM. They should not be content with progress on paper but demand progress on the ground and with implementation of reforms. This

should not, however, include predefining results. At the same time, awareness should be further raised through the provision of information on sustainable water management and use and participation of all stakeholders encouraged.

Notwithstanding these efforts, mind change cannot be orchestrated deliberately from above or outside but will have to develop over time. It could result from positive impacts of current reforms on the one hand and on the other from changing preferences of Kyrgyz society, like a sense for water scarcity or appreciation of nature conservation on a higher scale. Only if societal demand for the realization of further aspects of IWRM strengthens can a departure from the current half-hearted and asymmetrical 'way towards IWRM' be expected.

The revolutionary events of March 2005 and the subsequent formation of a new government might provide a window of opportunity needed to reshape water policy and initiate change in water governance. But the new government has so far not excelled at adopting policy changes or developing innovative reform steps. In addition, chances are that the pace of reform is, (at least) temporarily, slowed down, as staff is changing and the new government is adopting a more populist attitude towards the rural population.

However, the analysis also raises questions about the more distant future of Kyrgyz irrigation sector reforms. WUAs have a crucial role to play as change agents in the reform process. But until now they have mainly been initiated for economic reasons and as a condition to secure donor finance. Once donors withdraw from this field, WUAs will have to legitimize themselves more through the service they provide rather than by the money they bring in. This point is crucial for the further path of Kyrgyz water management towards IWRM. Furthermore, the notable asymmetries between single aspects of IWRM, in particular, are problematic. Even though it is up to democratically elected Kyrgyz decision makers to define societal preferences and thus to prioritize the objectives of Kyrgyz water management, the clear-cut neglect of sectoral integration stands in contradiction to the holistic ambition of IWRM. Modern water management acknowledges that ecological, economic and social spheres are interdependent. Thus additional efforts to integrate ecological, economic, and social externalities are highly recommendable.

"*If you want to govern the country,*
first learn to govern water."[1]

Introduction

In many regions of the world, water problems are on the rise. The main reasons are poor water management, population growth, and ecologically unsustainable economic development, leading to water pollution and overexploitation of freshwater resources. Although water war scenarios no longer top the agenda, as they did some years ago, it is generally accepted that access to and distribution of water causes conflicts today and will continue to do so in the future.

To prevent such conflicts, water allocation and use, and in particular the role of agriculture as a major water user, have become important topics in the development discourse in recent years. This is reflected in the announcement of the International Decade for Action 'Water for Life' from 2005 to 2015 by the United Nations or the rise of the new paradigm of Integrated Water Resources Management (IWRM). This new model of water management was developed in accordance with the paradigm of sustainable development and has emerged as a prominent topic on the development agenda since the beginning of the 1990s. Accordingly, IWRM approaches water management problems from a holistic perspective. The river basin perspective, integration of economic, ecological and social aspects, consideration of the principle of subsidiarity, and combination of supply-side measures with demand management are its key principles. UN Water, the coordinating body for water related activities and programs, identified IWRM as a priority for the water decade (UN 2005).

Over the past years, some first experiences have been made with the implementation of IWRM in several countries, among them developing and transition countries. The intention of the present study is to provide some answers to the question of what has been achieved so far. The Kyrgyz Republic, where IWRM-inspired water management reforms have been in the process of implementation since 2001, was chosen as a case study. Based on an analysis of Kyrgyz water governance, the study aims at assessing the status quo as well as the potentials and obstacles for the

1 Central Asian saying (FES / SOCINFOBURO / IISS 2004, 19).

realization of the normative framework of IWRM in a transition country like the Kyrgyz Republic. The objective is to compare today's institutional structure of water management with this normative concept to reveal the most significant gaps between norm and reality, but also to identify existing progress towards IWRM. The analysis is followed by concrete recommendations on how to further develop Kyrgyz water governance in a direction conforming to IWRM.

In Central Asia, a region with high water withdrawal and an unequal distribution of water resources, access to water is of major relevance for social and economic development. All countries in the region are highly dependent on irrigated agriculture. The reason for this dates back to Soviet times. Due to their favorable climatic conditions, Soviet policy forced the Central Asian republics to specialize in the production of highly water-consuming agricultural products, like cotton. Since the 1960s, orientation towards large-scale agriculture was further reinforced by the massive expansion of irrigation systems. This policy marked the beginning of the overexploitation of Central Asia's water resources, which has led to severe ecological problems.

When the Soviet Union broke up, the whole extent of the water crisis in Central Asia was unveiled. The most distinct result of persistent overuse of water resources is the Aral Sea catastrophe. Water extraction from its inflows Amu Darya and Syr Darya is the main cause for its desiccation. The consequences are regional climate change, glacial melt, desertification, dust storms, decrease in biodiversity, and poor water quality. The resulting negative influence on food security and health records make water management one of Central Asia's main development challenges.

The relative and absolute allocation of transboundary water resources between upstream (Kyrgyzstan, Tajikistan) and downstream (Kazakhstan, Uzbekistan, Turkmenistan) riparian states is highly controversial. The upstream states have been forced to continue respecting the quota system from Soviet times, which provides the politically dominant downstream states with the lion's share of the region's annual runoff. But the greatest conflict potential results from competing water utilization schemes in the region: The Kyrgyz Republic and Tajikistan prefer to release water resources in winter for hydropower generation, while Uzbekistan and Turkmenistan mainly depend on water allocation in summer for irrigation purposes. Additionally, distribution of water at the international level is

growing even more difficult as Afghanistan, recovering from civil war and Taliban rule, begins to demand its share.

As regards Kyrgyzstan, besides the exploitation of its huge hydroelectric potential, the agricultural sector is the driving force for the country's medium-term economic development. The country is highly agriculture-oriented, and more than 65 % of its population lives in rural areas (Kyrgyzstan Development Gateway 2003). While the industrial sector is still shrinking, about 39 % of gross domestic product (GDP) is generated in agriculture (World Bank 2005). Agriculture depends heavily on irrigation, since precipitation in most regions is not sufficient for rain-fed agriculture. Therefore, as in most other arid countries, 94 % of available water is claimed by the agricultural sector. After independence the agricultural sector grew significantly in terms of employment, because it served as a pool for unemployed persons from the other sectors. Today it accounts for slightly more than half of the country's labor force (Kyrgyz Republic 2004).[2] This shows the relevance of the agricultural sector, a functioning irrigation system, and efficient water management for poverty reduction in the Kyrgyz Republic.

Today, Kyrgyzstan, like all other Central Asian republics, is characterized by water consumption far above average. Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan range among the seven countries with the highest water consumption worldwide. With more than 2,000 m^3 per person per year, Kyrgyzstan ranges fifth, thus consuming more than three times the world average (WWF 2004, 16). Accordingly, the annual average use of irrigation water per ha exceeds 11.000 m^3 in some regions, which is far above international standards (UNECE 2000, 76).[3] These high rates are mainly due to large water losses, which are estimated to amount about 2.5 km^3, or 25 % of Kyrgyz water use (FES / IISS 2003, 7), a situation similar to that in the other Central Asian countries. As a consequence, even though Kyrgyzstan, being situated upstream, has abundant water resources, water scarcity is common in the country. But notwithstanding this scarcity, Kyrgyzstan does not yet fully utilize the quotas granted by

2 Note that figures from different sources on agriculture's share in GDP as well as on employment in agriculture show a great variation. The numbers cited appear to reflect the most plausible and commonly stated figures.

3 Egypt or Pakistan, for instance, which are also not known for efficient water use, apply 9–10,000 m^3 per hectare (Bucknall et al. 2003, 3).

international treaties. Therefore, water scarcity is not the fault of insufficient water provision due to these treaties. The main reasons for water scarcity in Kyrgyzstan must be sought in deficient irrigation infrastructure, poor water management, and low incentives for water saving. Thus, "*the water crisis in Central Asia is currently not a crisis of quantity but of distribution and use*" (UNEP et al. 2005, 21).

Nevertheless, with the continuing recovery of the Kyrgyz economy, and especially of the agricultural sector, the country is likely to come close to the given quotas in the medium term. Given the relatively marginal role Kyrgyzstan plays in regional affairs, and with politically and economically dominant Uzbekistan still depending on cotton production, though, it is unlikely that Kyrgyzstan will be able to obtain higher quotas in the near future, even though the largest part of the region's water originates here (IMF 2005b, 4 f.).

The only option to raise the availability of water is therefore to increase the efficiency of water use in the agricultural sector. Given the country' extremely high water use rates, there is considerable scope for improving efficiency. This does not only concern rehabilitation of the irrigation infrastructure. Additionally, "*a fundamental change is needed at national, regional and local levels in the institutional arrangements governing water, in particular for agriculture*" (Spoor 2004, 37).

In recent years, efforts have been undertaken to reform Kyrgyz water governance. The general reform process, which has been going on in the Kyrgyz Republic since the disintegration of the Soviet Union, is an opportunity to break with old patterns of water overexploitation and to attain a more sustainable system of agricultural production. Since independence, the Kyrgyz government has provided many impulses towards reforming the agricultural sector and the system of water governance. These include reorganization of the water administration, transfer of responsibilities to local Water User Associations (WUAs), and introduction of economic instruments like water fees. As regards the legislative framework, important steps have been taken in the direction of a more sustainable water management, e. g. with the adoption of the new Water Code by the Kyrgyz Parliament in December 2004, a step which clearly aims at introducing Integrated Water Resources Management (IWRM). Accordingly, the Global Water Partnership (GWP) has acknowledged that the country has a high potential for realizing IWRM, since its "*governance system is de-*

veloping rapidly" (GWP 2004, 16). Yet problems and open questions remain with regard to the implementation and enforcement of this ambitious legislation. It remains to be seen how fast and how far-reaching these reforms can be put into practice against considerable resistance from different stakeholders. In addition, the reform process could be slowed down by the political turmoil following the second round of parliamentary elections in March 2005, leading to the ousting of the former president, Akaev, and the election of the new president, Bakiev.

This study is based on qualitative field research, which was undertaken in spring 2005, the main instrument being semi-structured interviews and, to a lesser extent, tools of participatory rural appraisal. Overall, 100 interviews were conducted in several regions of the country and with various stakeholders at all levels of administration, with WUAs and farmers. For a detailed description of the empirical approach, cf. the Appendix.

The study is divided into two sections. Part A sets out the research design of the study. Chapter one contains the conceptual framework, including the development of a set of IWRM criteria for assessing the progress made in Kyrgyz water governance. Since the aim of this study is not only to depict the shortcomings and gaps of the Kyrgyz water sector with regard to IWRM, but also to give some indications of their causes, the second part of Chapter one highlights selected concepts of institutional economics that will serve as an analytical toolbox. The second chapter outlines Kyrgyz water governance by mapping the different administrative levels and organizations involved and highlighting water management reform. Special attention is given to Water User Associations (WUAs) because they are considered a key instrument for the implementation of IWRM at the local level.

Part B analyzes the extent to which Kyrgyz water sector reform is in line with IWRM and provides concrete recommendations for stakeholders, which are intended to help define further reform efforts. It is structured in accordance with the previously developed IWRM criteria. The third chapter analyzes whether eco-system interdependencies are integrated into the decisions taken by Kyrgyz water managers. Chapter four focuses on sectoral integration, investigating the degree of internalization of ecological, economic, and social effects in the process of water allocation. Chapter five deals with regulatory integration by analyzing decision-making structures, aspects of demand management, and the involvement of water

users in current water management. The final chapter summarizes the key findings and answers the question of whether and to what extent Kyrgyz water management is "*on its way to IWRM.*"

Part A: Research design

1 Conceptual framework: normative and analytical concepts

With a view to setting the study's conceptual framework, the first subchapter (1.1) introduces the concept of IWRM as a model of efficient water management, against which the reforms of Kyrgyz water management will be assessed. As a normative model or guideline, IWRM helps to identify achievements of the ongoing reform process as well as further reform needs. This assessment will provide the basis for recommendations on future reform efforts. However, if the recommendations are to be realistic, the causes of problems and constraints to reform need to be understood. The analytical instruments used to explain the functioning of Kyrgyz water management and its reform path are elaborated in the second part of this chapter (1.2). Selected concepts of institutional economics are presented as tools for identifying causes of lack of progress on reforms.[1]

1.1 Normative model: Integrated Water Resources Management (IWRM)

Since the early 1990s, IWRM has emerged as the new state-of-the-art model in water management. The 1992 International Conference on Water and the Environment in Dublin is generally considered as its origin. The principles of IWRM can now be said to have gained universal acceptance within the water community,[2] and influential organizations such as the Global Water Partnership (GWP) promote it actively. IWRM aims at improving water governance by introducing interdisciplinary thinking into a field traditionally dominated by engineers and technicians. IWRM has in fact been developed in response to growing problems of the formerly predominant "engineering" or "supply-side" approach to water management (GWP 2005a, 1). Thus, in order to understand IWRM's philosophy and the

1 For a general discussion of possible obstacles to water management reform, cf. GWP (2005a).

2 According to John Waterbury, IWRM has even become the 'mantra' of water managers (Waterbury 1997, 279).

Box 1: The engineering approach to water management

The engineering approach focused on technical solutions to making water supply fit increasing water demand. More often than not, this led to economically inefficient water policies. For instance, irrigated agriculture frequently received water at heavily subsidized prices. Thus water was not necessarily directed to the most productive use, or it was even provided at a loss. In the long run, this turned out to be financially unsustainable, particularly for developing countries faced with heavy debt burdens.

The constant upward trend in water supply and use also had severe effects on ecosystems, such as pollution, the desiccation of wetlands, or falling water tables. As pressure on water resources increased with growing populations and economic development, the conventional approach proved to be unable to respond to these ecological problems.

Finally, the engineering approach to water management was unsuited to take into account the social consequences of water management decisions, like the social costs of resettlement due to infrastructure projects, the impact of water policy on poverty or on gender relations, etc.

The inadequacies of the engineering approach can be traced back to five main factors:

— Water supply was seen as a free good, provided by the state in sufficient amounts to satisfy total demand. Thus the economic costs of supply were not given sufficient attention.

— Trade-offs between the economic – but also environmental and social – benefits of different water uses were not systematically assessed. Therefore, priority setting in water allocation was hardly rational.

— The engineering approach regarded water as an infinite resource, which could be exploited at wish. Ecological damage and its impacts on human well-being were widely ignored; environmental costs of supply und use were not reflected in water prices.

— Management structures were usually organized according to traditional territorial and administrative boundaries, ignoring hydrological (upstream-downstream, groundwater-surface water) and other ecological interdependencies (such as water-land interaction). This made sustainable water management more difficult to achieve.

— Management often followed a hierarchical top-down approach, which did not sufficiently consider the perspectives and needs of end users. The resulting distance between water managers and water users led to further losses of efficiency.

To summarize, the engineering approach was characterized by a fragmented, technology- and supply-biased view of water management, which did not allow water management to be perceived as the interdisciplinary task it necessarily is: a task that links both natural and social systems and affects most sectors of society.
Source: Own compilation

model's specific components, it is useful to have a closer look at the conventional approach first, as provided in Box 1.

The GWP defines IWRM as "*a process, which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems*" (Agarwal et al. 1999, 22, cf. also World Water Assessment Program 2003, 299). Thus IWRM aims at overcoming the weaknesses of the engineering approach in order to maximize the overall, social benefits of water use.[3] To achieve this general goal, IWRM pursues a holistic, that is to say an *integrated,* approach to water management. But what does 'integration' mean in this context? IWRM calls for threefold integration: ecological, sectoral, and regulatory (cf. Figure 1). Ecological integration means that IWRM is based on an eco-system approach; it systematically takes into consideration ecological interdependencies (1.1.1). Sectoral integration signifies that economic, ecological, and social externalities of water use are internalized in order to direct water allocation to uses that are most beneficial to society. Inter-temporal trade-offs are also taken into account to ensure that future generations will still be able to satisfy their needs, as enshrined in the principle of sustainable development (1.1.2). Regulatory integration requires decision-making structures to be organized according to the principle of subsidiarity. Decisions should be based on adequate data and combine supply-side measures with demand management, which aims at prioritizing demands and promoting efficiency of water use (1.1.3). These different components of IWRM will be discussed in detail in the following sections to elaborate criteria for assessing Kyrgyz water management in the agricultural sector.

3 Agarwal et al. (1999) and Neubert et al. (2005) provide authoritative introductions to IWRM. The GWP has also developed an IWRM 'Toolbox' (GWP 2005b). For a critical discussion of IWRM, in particular of the concept's diverging interpretations, cf. Huppert (2005a). Hartje (2002) discusses the international implications of IWRM.

However, it should be emphasized that IWRM is an overall concept that is very hard to realize completely in all parts of the world. The Kyrgyz Republic, as one of the poorest transition countries, can be expected even less to have fully implemented this concept in the given time frame. In addition, IWRM cannot provide a blueprint for water management reform. IWRM offers just a general framework of basic principles or guidelines for good water management. How this framework should be filled in detail depends on the specific context and preferences of each society and cannot be determined a priori (Agarwal et al. 1999, 44–45; GWP 2005a, 1). Nevertheless, IWRM indicates the direction that water management reform should take if the social benefits of water use are to be maximized. And it can be argued that poor countries that rely as heavily on their water resources as Kyrgyzstan does have even greater incentives to choose the IWRM approach.

1.1.1 The eco-system approach: ecological integration

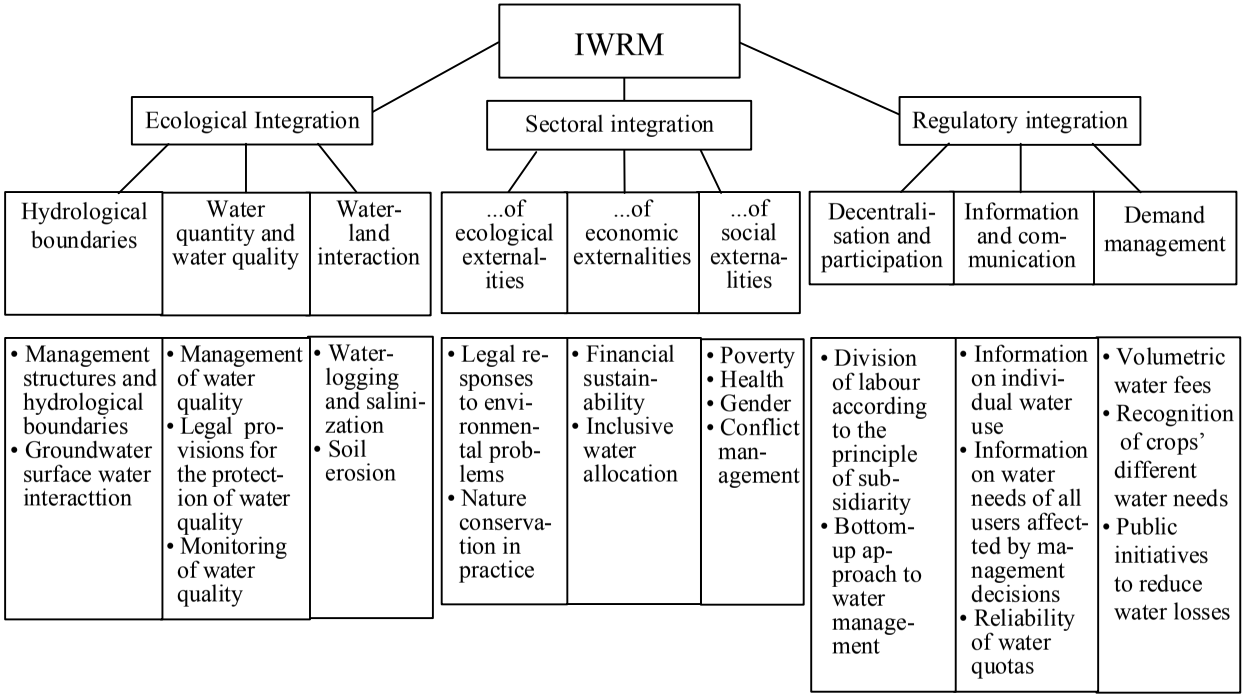
Hydrological boundaries

Water does not respect state, province, or district boundaries. It chooses its way along geomorphologic structures. Because of the one-way mobility of water within hydrological units, IWRM considers it imperative to manage a catchment area as a whole, with a view to internalizing positive and negative externalities of upstream uses on downstream riparians (Agarwal et al. 1999, 24). The general orientation of IWRM along hydrological boundaries can be broken down to sub-catchment areas.

Things are further complicated by the fact that surface water interacts with groundwater, adding a third, vertical, dimension of 'hydrological boundaries.' IWRM demands that water managers[4] consider these surface water-groundwater interactions to avoid, for example, pollution of groundwater by substances infiltrating from rivers, or the drying up of rivers due to groundwater overpumping (Agarwal et al. 1999, 25).

4 The term 'water managers' is used here for all people in charge of coming to decisions on water allocation, discharge regulation, and fee collection as well as on infrastructure financing, construction, operation, and maintenance: The term 'water management' accordingly comprises all tasks related to these spheres.

Figure 1: The IWRM Pyramid



Source: Own compilation

In order to assess water management in Kyrgyzstan against the model of IWRM, we will look into the extent to which management structures correspond to hydrological boundaries. If water along a specific canal or river is allocated by no more than one competent authority, this structure can be said to conform to IWRM. It should be noted that IWRM does not deny the need for different institutions at different levels of water management – e. g., at the level of tertiary canals, secondary canals, primary canals, rivers, and for complete catchment areas – but at each level management should cover the whole respective hydrological unit. In addition, we will look at the way groundwater-surface water interactions are handled. If Kyrgyz water managers consider these linkages systematically, they are acting in accordance with IWRM principles.

Water quantity and water quality

In the past, water quantity issues – in most cases measures for increasing water abstraction – have dominated water management, whereas problems of pollution, changes in temperature, or eutrophication have received much less attention. But both quantity and quality issues are important, and they are interlinked. If irrigation water is saline, for instance, this increases the risk that fields will salinize. In order to wash out the salt before the next cropping season, enormous amounts of water are needed to 'leach' it out of the topsoil.

In sum, it is of great importance to manage quantity and quality aspects of water in an integrated way. In the present study, one task will be to investigate to what extent this is done in Kyrgyzstan's agricultural sector. As water quantity issues have traditionally been in the focus of Kyrgyz water managers, the study will look into whether quality issues are beginning to receive more attention. Measures in this respect include regulations concerning the discharge of pollutants and waste, limits for the use of pesticides and fertilizers, as well as protection of water sources used for drinking water supply. Apart from the mere existence of such regulations, the key issue is their implementation. Management organizations should have the necessary competencies as well as the enforcement power to translate environmental regulations into practice. One precondition for enforcing environmental regulations is the existence of the monitoring capacities needed to collect the necessary data on water quality.

Water-land interaction

Ecological integration also requires that water managers bear in mind the impacts of land use on the water cycle and the consequences of water use for land areas (Agarwal et al. 1999, 24). A common problem of water-land interaction is siltation of reservoirs and canals due to upstream erosion. Erosion is frequently augmented by deforestation, intensive agriculture, or overgrazing. Deforestation also increases the abruptness of water runoff following precipitations, as forests normally act as buffers, favoring infiltration and evapotranspiration. Changes in water flow regimes for their part have considerable consequences for land areas. Decreasing flows may eliminate wetlands and turn lakes into steppes or deserts. Increasing flows – e. g. due to irrigation – provide needed humidity for plant growth, but they may also cause salinization or waterlogging of soils. Some of these water-land effects are intended, others are not; but to understand them and to consider their occurrence in managing water and land is an important element of IWRM.

How can this kind of integration be measured in relation to Kyrgyzstan's water management? Although the principle of water-land integration is rather abstract and difficult to grasp, evidence of efforts in this direction was detected in initiatives to limit erosion, salinization, or waterlogging. Farmers' awareness of these problems could indicate a tendency in this direction. In contrast, abandonment of formerly irrigated fields due to soil degradation or siltation of water supply facilities could prove to be effects of defective water-land integration.

1.1.2 Maximizing societal benefits: sectoral integration

... of ecological externalities

Growing awareness of ecological problems has contributed much to the development of IWRM. While the conventional engineering approach did not view nature as a legitimate water user, IWRM recognizes the relevance of nature. This aspect must be distinguished from the topic of ecological integration discussed above. Ecological integration can be understood as the mere consideration of eco-systemic interdependencies, which could also be motivated by a purely economic rationale (e. g. maintaining soil productivity). 'Integrating ecological externalities,' in contrast, means that

effects of water management on the environment are integrated into water managers' set of objectives: The beauty of nature and a sound environment are considered as values on their own. Thus, in the case of water scarcity for example, minimum 'ecological flows' must be guaranteed in order to sustain vital functions of the ecosystem. The political system should aggregate and translate social preferences into rules of water management that provide the society-specific 'optimum' amount of healthy nature in relation to economic gains from water abstraction, regulation, pollution, etc. Thus the ideal handling of ecological concerns cannot be defined *a priori*. However – as a minimum condition – explicit consideration of ecological aspects is needed in water management to satisfy the IWRM principle of integrating ecological effects. Additionally, current water policy should safeguard future generations' chances to enjoy a healthy natural environment.

These aspects will also serve to assess the performance of Kyrgyz water management. However, since it is difficult to judge generally the extent to which water managers recognize nature as a legitimate water user, the more concrete criteria used to measure the internalization of ecological externalities will be, first, the adequateness of legal responses to environmental problems and, second, the way in which nature conservation is considered in practical, everyday decisions of water management.

... of economic externalities

In relation to the economic sphere, sectoral integration demands that the costs of water supply be weighed against the benefits of water use. If no compelling social reasons justify subsidized water supply, full-cost pricing should be aimed for. This principle enhances overall economic efficiency and reduces public financial burdens, thus guaranteeing financial sustainability of water services (Agarwal et al. 1999, 41–42).

In addition, integration within the economic sector means that all water-using activities (such as agriculture, fishing, power generation, manufacturing, household provision with drinking water, transport, tourism, etc.) are jointly taken into account by water managers. In this way, water allocation can be oriented towards the most beneficial economic uses. In practice, scarce water resources have often been directed to economically less productive but politically powerful actors, e. g. the agricultural sector, which usually has the most privileges. Much water is consumed by rela-

tively low-value crops, such as wheat or fodder plants, although it might generate far greater benefits in manufacturing or drinking water supply, for example. In order to ensure efficient allocation of limited water resources, unjustified privileges of specific users need to be eliminated.[5]

This reasoning also applies to Kyrgyz water governance: Water provision should not operate at a loss in order not to compromise the financial viability of suppliers. Although this study's focus is on water use in agriculture, it will also touch on trade-offs with other economic uses. If allocation between different economic sectors is effected in an inclusive manner, favoring water distribution based on the relative benefits, management is in line with IWRM.

… of social externalities

Measurement problems similar to those encountered with ecological externalities appear again in relation to social externalities of water management. The value of human well-being, of poverty reduction, of equitable gender relations, or of social peace is impossible to quantify. However, water management has substantial impacts – both positive and negative – on these issues. Once neglected, social aspects have risen on the agenda of water management in recent years, not least in the context of the Millennium Development Goals. Additionally, debates on the consequences of water service privatization for the poor and popular protests against major dam projects have highlighted the extreme relevance of water policy for social issues. There is a consensus on the fact that good water management considerably enhances human development. Irrigation-based rural development in particular can contribute to combating hunger, reducing poverty, and decelerating rural exodus. As water needs are usually gendered (e. g. drinking water provision is frequently women's work), specific attention to the particular needs of women can contribute to gender equity.[6] Finally, when competition over increasingly scarce resources leads to growing 'water stress' (Falkenmark 1989), resulting conflicts may harbor

5 Subsidized water supply may be justified for social reasons (cf. below: "… of social effects"), but social policy is generally less costly (and less harmful to the environment in this case) if it is effected via direct financial transfers, which have fewer distorting effects on the economy (Agarwal et al. 1999, 61–62).

6 Women's participation in water management is also included in the Dublin Principles (Principle no. 2).

the risk of destabilizing local communities or even whole societies. Thus good management of water conflicts is particularly relevant for social peace.

Since the social effects of water management are multi-facetted, there is no simple criterion for measuring the internalization of social externalities in the Kyrgyz irrigation sector. However, clear-cut issues of interest include, first, the effects of water management on poverty, second, the integration of health considerations, and third, the integration of women's needs into water management. If the poor are not discriminated against in water allocation, water management can be said to have positive social effects. If water managers take health risks into consideration, and act accordingly, they contribute to internalizing social effects as well. Gender equity in decision-making procedures is of particular relevance with regard to women's participation (Agarwal et al. 1999, 17–18). Fourth and finally, the way in which water conflicts are managed will be considered as an indicator for the effects of water management on social cohesion and peace.

1.1.3 Managerial principles: regulatory integration

Decentralization and participation

As outlined above, water management traditionally adopted a top-down approach. Public authorities – like an infrastructure ministry or a ministry of water and natural resources – decided on behalf of the population how much water to deliver, to whom and when, as well as what infrastructure to construct. IWRM, on the contrary, demands that the division of labor within water management be organized according to the principle of subsidiarity (Agarwal et al. 1999, 15–17). This means that decisions should be taken at the lowest appropriate level. It is a common misunderstanding, though, to conclude that decisions should *always* be taken at the lowest level. This is not the case. Implementing IWRM also necessitates basin-wide coordination or even integration of decision-making structures. What is needed therefore is an adequate distribution of competencies over all administrative levels depending on the specific tasks to be carried out at each level. Nevertheless, in practice decision-making procedures in most countries' water sectors are still disproportionately centralized. Thus, in most cases IWRM implies that competencies should be further decentral-

ized (Agarwal et al. 1999, 46). In order to limit transaction costs, to boost the 'user-friendliness' of management institutions, and to improve communication between water managers and water users, participation of the latter should be increased. One possible – and broadly used – instrument to facilitate participation is the creation of WUAs. Irrigation farmers are encouraged to unite within these organizations to manage their own water supply at the local level. They are expected to decide on water distribution themselves and to care and pay for infrastructure operation and maintenance. Like other forms of decentralization, this direct involvement of end users in service provision is intended to improve the quality and promptness of water management by strengthening bottom-up communication and control.

In assessing the Kyrgyz water sector, it is tempting to take the mere existence of WUAs as an indicator for the realization of IWRM. While the creation of WUAs is certainly an important step in this direction, their concrete functioning must still be scrutinized in order to ascertain whether they actually possess the bottom-up qualities ascribed to them. Furthermore, the division of labor between the different levels of decision-making have to be evaluated, e. g. that between WUAs and district-level administration, to find out to what extent it is in line with the principle of subsidiarity.

Information and communication

The best organization of management structures will, though, be of little help if the data available are not sufficient to reach qualified decisions. As IWRM is holistic in its ambition, data requirements for the implementation of IWRM are considerable (Agarwal et al. 1999, 51–54). Data are needed on both ecological and socio-economic variables.[7] Ecological data include volumes of precipitation, amounts and distribution of surface and groundwater runoff, evaporation and infiltration, river flow regimes and their seasonal variations, water quality indicators, etc. Important socio-economic data include information on the amount and timing of water demand in different economic sectors, specific quality needs of economic

7 The integration of these two types of data constitutes a particular challenge, as the 'human factor' continues to be widely ignored in water management (Kluge 2005, 36–37).

users, elasticity of demand in relation to water price changes, reactions of users to water rationing, farm systems, water use efficiency, etc. Of course, collecting and processing *all* data needed for a truly holistic view of a river basin is neither possible nor rational considering the associated costs. However, it seems reasonable to assume that the database of most water managers has to be substantially enlarged if their aim is to implement IWRM.

The present assessment of Kyrgyz water management will analyze what kind of data are available to water managers. A major condition for increasing efficiency in the water sector is information on individual water use. Only if individual consumption is measured can water-saving behavior be rewarded. Thus water meters at farm gates would significantly ease the implementation of IWRM. In addition, local water managers and water end users need trustworthy information on the amounts of water that are actually delivered by the authorities. Only if water supply is reliable can water use be planned without intolerable risk. As regards socio-economic data, managers should be aware of the water needs of all users in their respective zone of responsibility, and consider these needs in their management decisions.

Demand management

In response to foreseeable limits of exploitable water resources as well as to growing ecological problems, IWRM has shifted attention to demand-side measures, i. e. to water saving. What does this mean in practice? Demand management in the irrigation sector aims to increase water use efficiency by improving infrastructure, by adapting irrigation norms, and by providing incentives for additional water saving, e. g. through pricing. The potential for water saving is enormous – more than half of irrigation water is usually lost through infiltration and evaporation before it reaches plant roots. Investment in water-saving technology and infrastructure (drip irrigation, lined and covered canals) can be provided by public authorities or by water users themselves, if they have appropriate incentives to do so. In addition, overwatering is a frequent phenomenon in irrigated agriculture. In post-Soviet Central Asia in particular, outdated irrigation norms

appear to contribute to the waste of water.[8] Adapting these norms to real crop water needs would thus contribute to decreasing water demand as well. Water managers may encourage further water-saving behavior, for instance, the planting of water-saving crops. Possible incentives include calculation of water fees on the basis of actual water use (volumetric fees) rather than in relation to irrigated hectares and water markets, which may, however, run up against practical difficulties (Agarwal et al. 1999, 21).

In an assessment of Kyrgyz water management, volumetric water fees would be a clear sign of demand management, as would further public initiatives to improve water use efficiency, e. g. through water-saving infrastructure. Another important criterion for change in this direction would be improved knowledge of specific crop water needs.

1.2 Analytical framework: institutional economics

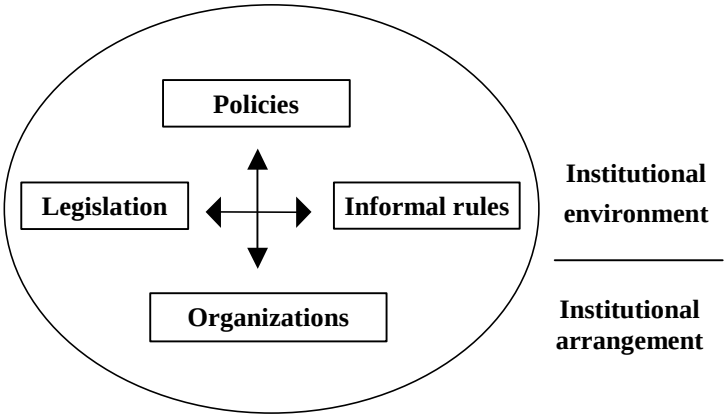
The shift from classic water supply management to IWRM requires changes in water governance as well as in people's attitudes. The following provides a toolbox designed to help identify the most relevant institutional hindrances and possible trigger points for the implementation of IWRM. After briefly introducing and discussing the term water governance, we will focus first on the design of institutions and second on conditions for institutional change.

In institutional economics, institutions form the framework in which interactions between individuals take place, or the 'rules of the game'.[9] Organizations are a special category of institutions in that these rules are implemented through them and at the same time influenced by them. Organizations are players acting in a specific way to achieve their goals (North 1990, 5). The term 'institutional arrangement' refers to the sum of all organizations involved in water management. The term 'institutional environment' means the sum of all institutions and includes formal rules (legislation), informal rules, and policies. Water governance covers the

8 On average, the Central Asian countries use 1.5 times more water than recommended by water experts (ICG 2002, 12).

9 "*[Institutions] are the humanly devised constraints that shape human interaction. In consequence they structure incentives in exchange, whether political, social, or economic*" (North 1997, 2).

Figure 2: Water governance



Source: Modified from Saleth / Dinar (2004, 102)

ensemble of institutional environment and institutional arrangement, i. e. all institutions and organizations involved in water management as well as their interactions (cf. Figure 2).[10]

While IWRM formulates 'best practices', i. e. deals with specific contents of water management, the categories presented in the following section aim to explain the institutional implementation of water management (1.2.1). The last section refers to potentials of and obstacles to changing this institutional setup (1.2.2).

10 Some authors subsume informal rules under laws (Bandaragoda 2000, 10), but with regard to the cleavage between formal and informal rules they are treated as an independent analytical category in the present case.

1.2.1 Explaining water governance

To explain water governance, it is helpful to have a look at specific features that characterize water-related institutions and organizations. In interaction with the social environment, these features are important for the ability of institutions to facilitate change.

Formal and informal institutions[11]

Ideally, formal rules derive from informal ones in such a way that customs and traditions serve as an anchor for formal laws and policies. This reduces transaction costs[12], because such institutions are widely accepted and generally more stable.

Referred to Kyrgyz water governance, this means that successful implementation of the new water legislation and policies depends on whether account is taken of existing informal institutions and rules. If this is not the case, implementation and enforcement are likely to be obstructed and to entail considerable transaction costs.

Embeddedness

Water institutions exist not in a vacuum but within the broader institutional framework of society. The introduction of new water policies therefore not only requires consideration of informal rules, it also has to be embedded in the overall institutional framework, which is constituted by other (higher) societal rules, e. g. constitutional rules (Saleth / Dinar 2004, 29).

Thus, to be successful, the new Kyrgyz water legislation or water policy needs to take into account existing rules such as land rights, environmental legislation, and also informal institutions such as existing norms of water distribution. Only if water policy is closely linked to these existing sets of

11 While formal institutions include, for instance, laws and policies, informal institutions refer to customs and traditional norms etc.; the latter are referred to as rules-in-use, which often have a greater influence than formally declared laws (Eggertsson 1996, 13). Informal institutions are determined by traditions, clan membership, and kinship relations, etc.

12 Transaction costs are defined here as costs linked to economic exchange.

formal and informal institutions can there be scope for successful implementation.

Stability and durability

Stable institutions provide continuity for human interactions, thereby reducing uncertainty and improving the framework for exchange by minimizing transaction costs. In addition, the stability of institutions is influenced by two factors: the learning ability of organizations and path dependency. Learning ability refers to how quickly and flexibly an organization adapts to new knowledge. Good learning ability is essential for a stable organization. Otherwise it will be simply replaced by new organizations. Path dependency, on the other hand, refers to the phenomenon that institutional change is always limited in scope. A complete turn-around is not possible, because 'history matters' for institutional development, and because institutions that have existed for a long time develop increasing returns and economies of scale. These give them advantages vis-à-vis alternative institutions, even when the alternatives may be more efficient in the long run (Doering / Rose 2002, 10). Thus path dependency constitutes a constraint for change but at the same time a guarantee for stability.

With the adoption and implementation of the new water legislation in Kyrgyzstan, many formal rules are subject to change. In this atmosphere of instability, informal rules and institutions are likely to gain importance since they appear to be the ones that guarantee stability in a changing environment.

Accustomed as they are to the top-down oriented Soviet scheme of water management, Kyrgyz water managers may lack learning ability and find it difficult and inappropriate to implement certain new rules, for example participation of all stakeholders, since the latter are too distant from the former's 'traditional' perception of water management, and are furthermore associated with the transfer of power. For the same reasons, water users may be reluctant to claim their rights to participate. Thus participation is likely to materialize only if considerable change takes place in thinking and probably also in the staff of water management organizations and if water users become aware of the chances participation holds for them. The same applies for the principle of decentralization, which, without certain changes in the staff of water management organizations, is likely primarily to benefit the old elites.

Structure and nestedness

Institutions as well as organizations are usually hierarchically structured and may be structured spatially as well. Within this structure there are linkages between different levels, forms of nestedness, overlapping of competencies as well as regulation-free spaces.

If it is to be efficient, Kyrgyz water governance has to recognize existing organizational structures and if new organizations and institutions are developed, it must abolish others or adjust them to the current structures without duplicating competencies or creating regulation-free spaces. This could be especially relevant with regard to the structure and competencies of the ministries concerned as well as of the WUA federations that are replacing *RayVodKhozes*.

The determinants of transaction costs

The exact composition of these features determines how costly exchanges are for individual actors (North 1997, 2). To be able to point out more clearly what features influence transaction costs to what degree, the following four determinants for transaction costs will now be introduced. The concrete design of these determinants results from the interaction of institutional features. It may be helpful to clarify which elements of water governance are important – for lowering transaction costs or for raising them.

Property rights: The first determinant is the security and measurement of property rights to goods or services. Property rights are defined as control over valuable assets (Eggertsson 1996, 7). Thus the term refers to the distribution of power within society. It is assumed that clearly defined (and accepted) property rights facilitate exchange. For instance, uncertain rights regarding land tenure or water use can hinder investment in infrastructure and thus hamper the implementation of IWRM.

Enforcement of rules: This factor refers to conflicts that may arise in human interactions. In a world of perfect enforcement all stakeholders would be forced to adhere to the rules and a third party would resolve conflicts impartially and without cost. In reality, the enforcement of rules depends mainly on the quality of the (formal) judicial system or on other (informal) mechanisms of conflict resolution. New rules, like new water legislation or

the introduction of water fees, are thus dependent on the vigorous support of judicial organs or other organizations able to accomplish the task.

Behavioral factors: Behavioral factors comprise all non-economic drivers of human activities, such as ideologies, perceptions, and preferences. Often it is supposed that these factors augment transaction costs because they prevent people from acting purely rationally, i. e. in line with their own economic self-interest. But behavioral factors such as reputation, credible commitments, and social capital can also have positive effects, i. e. in reducing transaction costs. Formal institutions become generally more effective when they take such factors into consideration. An example in the Kyrgyz context is the belief in water as a gift of God. Since water has been a free good for a long time, and many people regard it as God-given, it is difficult to implement the principle of water fees in this context, and attempts to do so can be only successful if fees are introduced cautiously and gradually.

Socio-economic environment: Institutions interact with the socio-economic environment. This has considerable influence on transaction costs. Changes within the environment – like revolutions, regime change, etc. – can set strong incentives for institutional change when uncertainty outweighs the stability of institutions. Thus the general uncertainty connected with the revolutionary overthrow and the change of power in the first half of 2005 might serve as a catalyst for change in Kyrgyz water management, as regards for instance the composition of staff etc.

1.2.2 Explaining change in water governance

Using the categories introduced above, it is possible to estimate the quality of an institutional setup. If transaction costs are high, institutional change is required. The basic assumption that institutional change occurs when the opportunity costs of maintaining the status quo exceed the transaction costs of changing it (Saleth / Dinar 2004, 155) does not say anything about the concrete course of change.[13] The latter is influenced by several factors. The following sections will present a model for institutional change introducing the notion of 'mind change.' A next step discusses the interactions

13 Costs in this context include both economic and non-economic costs – such as social costs.

between individual incentive systems and institutional change as well as concrete reasons for such change.

Course of change

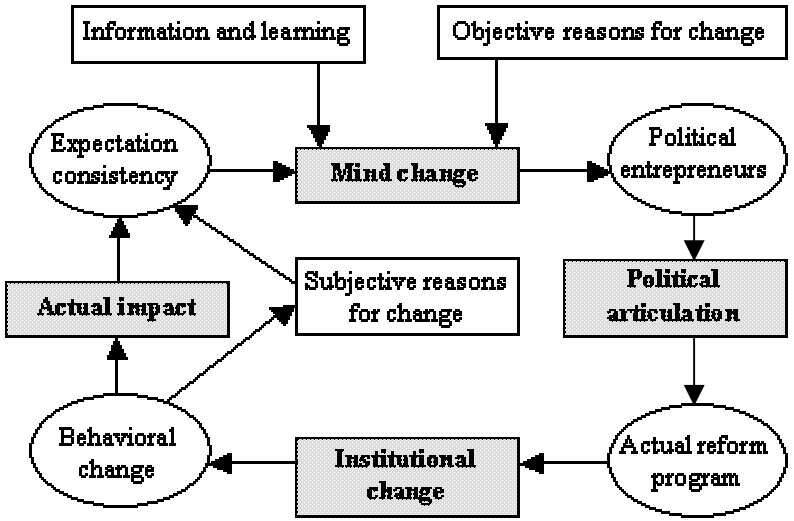
The subjective theory of institutional change presented by Dinar and Saleth (2004, 75 f.) emphasizes the importance of 'mind change' for institutional change (cf. Figure 3). Dinar and Saleth assume that prior to any successful reform there has to be a shift in the collective attitude of people towards their institutions and preferences. Even if people diverge in their opinions about the direction of change, they often agree about its necessity. This situation can be described as perceptional convergence, which creates a demand for institutional change.

'Mind change' is understood as the result of an interaction between several factors. Reasons for change interact with behavioral factors. New knowledge diffuses through the learning ability of institutions. Thus 'mind change' refers to a change in people's perception of their institutions, *"a change in their mental construct of the world, and it gathers power when a critical mass of perceptional convergence builds up"* (Saleth / Dinar 2004, 79).

As the cycle model implies, 'mind change' can be the starting point of institutional change, an unconscious sense of discontentment with a situation. But it may also be the final product of an externally induced process. Additionally, it can function as backing for political entrepreneurs who articulate their actual reform agenda. Their bargaining strength and the political process determine the concrete shape of institutional change, which in turn may effect shifts in people's behavior, called 'actual impact' in the model. In the long run, these behavioral changes may again change people's minds.

Despite its fair amount of simplification, this model provides fruitful categories for the analysis of institutional change, especially against the background of the fact that IWRM, as a normative framework, requires considerable behavioral changes from both water managers and water users. Looking into the role played by mind change in the current reforms of Kyrgyz water management helps to understand the problems related to this process.

Figure 3: Subjective model of institutional change



Source: Adapted from Saleth / Dinar (2004, 79)

Reasons for change

Viewing 'mind change' as a possible product and at the same time as a basis for institutional change, we must ask for concrete reasons that contribute to such perceptional convergence. Apart from the influence of information and learning on institutional change, these reasons can be grouped broadly into two categories: objective and subjective ones. The objective reasons include technical developments or a shift in relative prices resulting for instance from a change in resource endowments. In the context of water management, objective reasons for change can result from deteriorating irrigation infrastructure or the inability of the state to further finance the rehabilitation and construction of irrigation and drainage systems. The subjective reasons for change comprise shifts in ideas or ideologies. Such shifts have implications for water institutions because of their embeddedness within broader societal rules. The intro-

duction of IWRM itself amounts to such a change in ideas within the water sector.

Reasons for change can thus contribute to the formation of a perceptional convergence. But individual behavior based on simple cost-benefit ratios also plays an important role.

Individual behavior and institutional change

Institutional change is to a large degree driven by change agents, individuals, or organizations that seek to improve their position by catalyzing change processes. At the same time, change of the kind involved in the introduction of IWRM "*usually involves reductions in discretionary authority on the part of existing managing agencies*" (Svendsen / Wester / Molle 2005, 2). Thus individuals or organizations fearing to loose influence can seek to prevent change. To understand the trigger points for change and the reasons for persistence of an institutional structure, it is important to note the incentives driving individual behavior. Thus the level of individual choice based on personal benefit calculations may be associated with the amorphous phenomenon of institutional change. The following 'incentive systems' are theoretical ideals, and they describe general mechanisms more than concrete situations.

A model frequently used to explain individual incentives, especially in hierarchical institutional arrangements, is known as the principal-agent constellation. It describes an information imbalance between a principal and her/his agent. As a result of this imbalance, the principal loses control over the agent's activities, and this opens up opportunities for the agent to act solely with an eye to her/his personal benefit. The efficiency of the organization suffers from this behavior and this raises transaction costs for other individuals who, in their exchanges, are dependent on the organization's services. The agent's behavior frequently leads to social losses that exceed the agent's personal gains. In order to ensure her/his rent from the information imbalance, the agent may influence change in a certain direction, or even impede institutional change.

Principal-agent constellations are often connected to another incentive system for individual behavior: moral hazard. It arises when collective rationality contradicts individual rationality and individuals choose to act

Box 2: Kyrgyz water resources and their use

Kyrgyzstan is situated in a rather arid, continental region. Nevertheless, because of its markedly mountainous geography, the country holds abundant water resources of regional importance. The main source of water in Kyrgyzstan is precipitation in the form of snow. It accumulates predominantly in the mountainous regions during the winter season, between October and April. As a consequence, major shares of Kyrgyz water reserves are stored in glaciers and permanent snowfields.

There are an estimated 3,500 rivers originating on Kyrgyz territory, most of which run across the country's borders to neighboring states. For that reason, downstream riparians, in particular Kazakhstan and Uzbekistan, depend on Kyrgyz water resources. Besides surface water, Kyrgyzstan has large groundwater reserves, which are presently exploited only at a fraction of their potential. The largest reserves, however, are surface lakes and reservoirs, above all Lake Issyk Kul, one of the Earth's deepest lakes.

The annual drain of surface water on Kyrgyz territory amounts to about 44 km³/year, while total renewable water resources are slightly higher, 46.5 km³/year, including surface and groundwater. Because of its important supply function for neighboring states, Kyrgyzstan has committed itself in international agreements not to consume more than 24 % of the total annual surface runoff. On average, this amounts to about 11.6 km³/year.

Agriculture represents by far the most important water-consuming activity in Kyrgyzstan. It accounts for 94 % of total water use, while industrial and domestic water uses share the remaining portion, with 3 % each. The explanation for the huge share accounted for by agriculture is the marked predominance of irrigation. Precipitation in the regions suitable for agriculture mainly ranges between 200 and 400 mm and does not exceed 600 mm per year, a circumstance which makes rainfed agriculture impossible in most places.

Total water use amounts to about 10 km³/year, and this consists basically of surface water. Groundwater represents only 6–7 % of total uptake and is mainly used for drinking water supply. The urban population, which accounts for about 35 % of total population, and large parts of the rural population are served by groundwater.

Source: FAO AQUASTAT (2004), FES / IISS (2003, 6), UNECE (2000, 69 and 74 f.), data provided by the Institute of Water Problems, Bishkek

according to their own individual rationality to the detriment of society. Conditions of insecurity for individual actors and information asymmetries support this behavior (Eggertsson 1994, 32). If, for instance, water provision is insecure, this situation can be exploited by a water master (*mirab*)

to extract extra charges for water delivery from water users (Huppert 2005b, 10).

Outlining the beneficiaries and losers of these constellations is an important step towards analyzing the conditions for institutional change or persistence. In the end, whether and how change takes place depends mainly on the bargaining strength of these beneficiaries and losers (individuals and organizations).

2 Water governance in Kyrgyzstan

The aim of this chapter is to give a descriptive overview of Kyrgyz water governance, which will facilitate access to the analytical chapters (part B). Boxes 2 and 3 serve as an introduction to the topic, giving an outline of available water resources and their use as well as some general information on the Kyrgyz agricultural sector.

Since the Soviet legacy plays an important role in Kyrgyz water governance, the first section (2.1) of this chapter provides a short review of water management before 1991. The chapter then takes a closer look at the ongoing reforms in the water sector. Section 2.2 focuses on the institutional environment, explaining Kyrgyz water legislation (2.2.1) and the legislation on WUAs (2.2.2). Section 2.3 concentrates on the institutional arrangement, describing first the governmental water management bodies (2.3.1) and second the local organizations involved in water management (2.3.2).

Box 3: The Kyrgyz agricultural sector

Agriculture is the key pillar of the Kyrgyz economy, accounting for 39 % of the country's GDP in 2003 as well as for slightly more than half of its labor force. Because of its mountainous topography, only 7 % of Kyrgyz territory is suitable for agriculture. The scarcity of arable land therefore constitutes an important limiting factor for agricultural production. At present, the cultivated area (annual and permanent crops) amounts to 1.35 million ha. Of this area, 1.07 million ha, or 80 %, are irrigated. Irrigated agriculture in Kyrgyzstan is confined to the main river valleys and hence concentrated on four principal regions: the Chu and Talas rivers in the north, the Naryn river in central Kyrgyzstan, the surroundings of lake Issyk Kul in the east, and the Ferghana Valley in the southwest.

The crops most commonly grown in Kyrgyzstan are cereals, which cover almost 60 % of the cultivated area. In particular, wheat cultivation was broadly expanded after independence, with total production more than doubling between 1990 and 2002. This can be explained by the fact that the country has set its sights on self-sufficiency in wheat production. Other important crops are barley, maize, potatoes, sugar beets, vegetables, cotton, oilseeds, and fodder crops. Sugar beets, mainly used for lucrative sugar and vodka production, are a significant cash crop in the northern Chui *Oblast*, whereas cotton, rice, and most of the tobacco crop are grown exclusively in the southern Ferghana Valley. Fodder crops have declined in importance since Kyrgyz independence, but they still occupy a significant share of agricultural areas in the northern parts of the country. Furthermore, many Kyrgyz farmers raise livestock, and milk, meat, and wool production are the major sources of income in agriculture. Livestock breeding currently generates about 60 % of gross agricultural income in Kyrgyzstan.

Although agricultural yields are comparatively low, Kyrgyz agriculture has recovered since 1996, and in 2001 it surpassed Soviet era production levels, leading the World Bank to label Kyrgyz agricultural reforms and subsequent agricultural growth a 'success story.'[14] Figures indicate that there has been an increase in total agricultural production of more than 20 % over 1992. Since the cultivated area has declined meanwhile, this can only be explained as the result of an increase in yields.[15]

Source: FAO AQUASTAT (2004), FAOSTAT (2004), Fitzherbert (2000), Kyrgyz Republic (2005), Kyrgyz Republic/National Statistical Committee (2003b), UNECE (2000, 113), World Bank (2004a, 10 and 2004b)

2.1 The Soviet legacy

Incorporation into the Soviet Union changed water management in Central Asia radically. Already in 1923, the Soviet administration abolished the traditional form of water management (cf. Box 4). Kyrgyzstan was divided into several hydrological regions based on soil type and climate, and this

14 The World Bank distinguishes between a 'recovery period' (1996–1999), during which the newly established private farms considerably increased production for self-consumption, and a 'post-recovery period' (1999–2002), during which continued agricultural growth was accompanied by a shift towards market production (World Bank 2004a, 14–30).

15 IMF (2005b, 10) provides a good overview of productivity increases for different crops.

in turn served to specify the amount of water to be applied within a determined time period and for different crops. These hydrological standards, which were elaborated between 1940 and 1960, are still in use.

Following the collectivization of land, central planning was imposed on farmers. In order to increase cotton production, with its high water consumption, the Soviets expanded Central Asia's irrigation network beginning in the 1940s. The consequence was a significant increase in water use.[16] With a view to meeting the irrigation needs of the downstream republics, huge reservoirs were built in Kyrgyzstan (O'Hara 2000, 370 f.). This policy has led to an extreme overexploitation of Central Asia's water resources, with negative impacts that have persisted until today.

In the Kyrgyz SSR, inter-farm canals fell under the responsibility of the state, and their operational costs were covered by the national budget, whereas on-farm irrigation networks belonged to the members of collective farms. In spite of that, water end users were not involved in the operation and maintenance of their irrigation systems. Irrigation management was in the hands of a small number of specialized workers, the so-called irrigation brigades (Johnson III / Stoutjesdijik / Djailobayev 2002, 4).

Soviet water governance was characterized by an engineering approach. The maintenance work was done with heavy equipment purchased by the government. On every farm, the brigade leaders calculated the needs for their respective area (50–100 ha of land) and passed them on to the farms' hydro-technician, who compiled the water requirements for the whole farm. The data were then sent to district, province, and republic offices, before finally being submitted to the basin organization. Then instructions were sent back, informing the agencies responsible for water delivery at the different levels on the amounts of water to be supplied to the various parts of the network.

16 Between 1960 and 1970, water use in the Aral Sea Basin rose from 65 km³ to almost 104 km³. Altogether, the Soviets opened an additional 5 million ha of land for irrigation in Central Asia, bringing the total area of irrigated land to 7.5 million ha (O'Hara 2000, 370 f.).

Box 4: Traditional water management in Central Asia

The first irrigation canals in Central Asia were built some five to six thousand years ago. The irrigation system considered as 'traditional' was developed in the 7th century under Arab influence. In this system, which was in place until the end of the 19th century, the official responsible for decisions on water allocation for the main canal system was called *mirab bashi.*[17] The persons in charge of the management of secondary canals were local *mirabs*. *Mirab bashi* and *mirabs* were elected and paid by the peasant farmers. Their salary depended on the degree of water users' satisfaction with their work. *Ketman*, water user associations comprising 3–4 villages, were responsible for the construction and maintenance of the irrigation system and for water distribution. Each village elected an elder (*aksakal*) who assumed overall responsibility for water management. When construction work became necessary, the *mirab bashi* and the *mirabs* conscripted the *ketmans* to do the work. Villages at the head of a water supply canal, which received more water, had to contribute more time and resources to construction projects. All water users were obliged to take part in annual maintenance work on the irrigation network. Individuals who refused to participate were denied access to land and water.

Source: FES / SOCINFOBURO / IISS (2004, 19), O'Hara (2000, 373)

According to O'Hara (2000, 375 f.), the different bodies involved in the water management of the Aral Sea basin only theoretically respected management structures corresponding to hydrological boundaries. In practice, however, two departments under the same ministry communicated with each other only indirectly, via Moscow. This insufficient communication and information flow within an extremely hierarchical structure was one reason for inefficient water use. Furthermore, Soviet-era irrigation infrastructure increasingly deteriorated, resulting in a huge waste of water. Reinforced by unsuitable modes of production, the consequence was widespread soil degradation, especially through waterlogging and salinization.

In contrast to pre-Soviet times, access to a sufficient quantity of water was not a problem. Water supply was supposed to satisfy total demand, but efficiency of water use received little attention. Many users thought they had access to an infinite quantity of water free of charge, and they no

17 *Mirab* means 'water master' (compound from the Arabic *mir* 'master' and *ab* 'water'). In Kyrgyzstan, it is mostly referred to as *murab*. *Bashi* means 'head.'

longer viewed water as a scarce resource. As a consequence, they started to waste water, a problem Kyrgyz water managers are struggling with today.

2.2 Institutional environment

After the Soviet Union collapsed, the Kyrgyz Republic became responsible over night for financing, managing, and maintaining its irrigation system. In particular, the misfit between existing water management and land ownership patterns, which changed in the wake of comprehensive and far-reaching land reform, made water governance reform necessary. Land reform influenced irrigation management mainly by splitting up large farms into numerous small agricultural units (cf. Box 5). The secondary and tertiary canals, however, were conceived by the Soviets for unitary management: Each canal served up to 900 ha of land, with turnouts for every 40 to 60 ha. Nowadays, parts of the tertiary canals formerly belonging to the Soviet on-farm irrigation system have turned into inter-farm systems. Up to ten farms operate within a former field, each of them demanding its own water supply with different volumes and watering times (Bloch / Childress 2003, 13 f.).

Box 5: The Kyrgyz land reform

One of the major challenges for the newly independent Kyrgyz Republic was to privatize land, and to make farms responsible for their own agricultural production. Thus, in 1999, the Kyrgyz Parliament approved the 'Land Code of the Kyrgyz Republic,' which established private ownership of agricultural land, including the right to purchase, sell, and rent such land. However, the law 'On Agricultural Land Regulation' (2001) establishes restrictions on land sales and purchases, limiting the amount of land transacted, permitting a farmer only to sell whole privatized land shares, if she/he has resided in the rural area in question for at least two years, and stipulating that land must be sold exclusively to Kyrgyz citizens. Responsibility for the Agricultural Land Redistribution Fund (ALRF), which comprises unutilized or underutilized land, was handed over to the *ayil okmotus* (local self-governments; cf. 2.3.2). The lease period was increased from one to a minimum of five years.

As a result, Kyrgyzstan's agrarian structure is highly biased today. Peasant farms are the main organizational form of agricultural entities. Their number increased from 4,100 in 1992 (1 % of agricultural land) to 84,700, or 23.3 % of agricultural land, in 2002. At the same time, state and collective farms have declined in

importance. Broadly speaking, peasant farms are mostly small farms working between 0.2 and 0.5 ha of land, whereas the majority of collective and state farms are large enterprises with more than 100 ha of land. About 75 % of farmland is owner-operated; the rest is leased either from other farms or from the ALRF.

Differences in farm production between northern and southern Kyrgyzstan are due to climatic conditions, agricultural specialization, and farm size. Owing to higher population density and the land scarcity it entails, land plots in the south are generally smaller and more intensively cultivated than those in the north, where land ownership is still rather concentrated. The majority of peasant farmers have adopted a self-sufficiency strategy based on risk minimization, aiming to provide their family members and workers with food for their own consumption. Only under favorable market conditions are crops sold.

Implementation of the land reform is faced with two main problems. First, abandonment of state agricultural and economic planning required farmers to develop entrepreneurial capacities and to gain access to markets. Yet in many cases local markets are dysfunctional due to lack of infrastructure, information about prices, and/or cash availability. The result is the evolution of a vast barter system involving the private and the public sector alike. Second, access to land is still problematic for a considerable number of farmers, mainly due to lack of information about their legal rights. Besides, the privatization process has generated inequity in land distribution, since influential actors often gained preferential access to larger areas of better quality land situated along the upstream reaches of irrigation systems.

In connection with the uprisings following the parliamentary elections in March 2005, it became obvious that the land reform process in Kyrgyzstan has not yet been completed. People began to seize land on the outskirts of Bishkek, demanding legal land titles, which they claim to have been deprived of under the former regime. The land seizures have also highlighted the national north-south cleavage: The land occupiers often originate from the poorer south of the country, which suffers from land scarcity, whereas in the wealthier and less densely populated north, land reform was less comprehensive, leaving in its wake unused or underused land plots.

Source: Bainazarov (2003), Bloch / Rasmussen (1998, 112), Childress et al. (2002, 9 f.), Kyrgyz Republic /National Statistical Committee (2003a, 48 f.), Kyrgyz National Information Agency (2005), Spoor (2004, 16 and 29), Ul Hassan / Starkloff / Nizamedinkhodjaeva (2004, 6 f.).

The efforts to reform in Kyrgyz policies are reflected in the new Water Code as well as in the withdrawal of the state from management of the tertiary canal system and some secondary canals, which were handed over to Water User Associations (WUAs). Apart from the formal institutions

and rules, that will be described in the following sections, there are also informal rules that play an important role for Kyrgyz water management. Such informal rules can be observed especially in connection with water allocation and the settlement of conflicts. These rules will be analyzed in Chapter 4.3.4.

2.2.1 Water legislation

In 1994, the Kyrgyz Parliament approved the 'Law on Water of the Kyrgyz Republic,' which was characterized by several weak points, such as a lack of enforcement mechanisms or its failure to define the exact competencies, tasks, and duties of the state water management bodies. Subsequently, the Kyrgyz government, with the strong support of donors, set out to develop a new Water Code, which clearly derives its orientation from IWRM. It was approved by the Kyrgyz Parliament in December 2004.

One key feature is the introduction of long-term rights to abstract specified quantities of water. For abstraction of water directly from the source, the Code provides for long-term water use permits for 15 or, in special cases, even up to 50 years, "*if a substantial long term investment is to be made by an applicant into construction, improvement or rehabilitation*" (Kyrgyz Republic 2005, Art. 23). Additionally, the Code introduces long term water supply contracts for the delivery of defined water quantities to WUAs, thereby providing them with both legal certainty and water security (Art. 33 f.).

The Code also aims at promoting private sector investment and providing planning security for state water management organizations. In addition, the Code redefines the competencies, tasks, and duties of state bodies involved in water management (Art. 7 f.). Water users are entitled to participate in the planning and management structures envisaged for the principal river basins, which are to be guided by Basin Councils (Art. 5 f.). There is also a provision on establishing Irrigation and Drainage Commissions at the national, basin, and local levels; these are to act in the capacity of consultative and control bodies (Art. 79). Furthermore, the new Water Code contains a set of ecological provisions.

Finally, the new water legislation increases water resource monitoring and introduces a system of water use planning (Art. 17 f.). The Code promotes

the collection of information relating to the use and management of water resources, for example by introducing a register of water use permits (Art. 32).

2.2.2 Legislation on WUAs

In 1995 and 1997, with the support of international donors like the World Bank, the government decrees 'Regulations on WUAs in Rural Areas' and 'Statute of WUAs in Rural Areas' ordered the establishment of WUAs (Sehring 2005, 7). The 'Law on Unions (associations) of Water Users' was passed in 2002. It defines the legal status and the organizational basis for the establishment and operation of WUAs as voluntary, non-commercial organizations operating in public interest. The law charged WUAs with the task of maintaining the irrigation and drainage network situated within their respective service area, which is financed through a WUA fee to be paid by water users.

Under the Kyrgyz Land Code, ownership of tertiary irrigation infrastructure can be transferred by government decision. Initially, it was turned over to the *ayil okmotus*, which were technically and financially overburdened by the task of properly managing and operating the irrigation system. As a consequence, irrigation infrastructure continued to deteriorate, water losses in canals increased, and the productivity of irrigated crops declined. In 2004 the decree 'About Transferring Irrigation Systems to the Ownership of Associations of Water Users and Their Entities' accorded to the legally registered WUAs ownership rights over the irrigation and drainage systems within their respective service areas.

2.3 Institutional arrangement

After independence, a key task for the Kyrgyz government was reform of the institutional arrangement inherited from the Soviets. At present, reform of water management bodies is a pressing problem in Kyrgyzstan. The ongoing reforms aim at both reducing administrative staff and sharing budget funding for water management. In addition, coordination among state administration bodies is to be improved "*by eliminating parallel functions, separating their rights and responsibilities and improving the*

Box 6: The administrative structure of the Kyrgyz Republic

Currently, the administrative-territorial system of the Kyrgyz Republic has four tiers. The Republic is divided into seven provinces, or *oblasts*. Each *oblast* has a capital city, where most important administrative organizations (including deconcentrated branches of the central ministries) are located. The *oblasts* are divided into districts or *rayons*, which again are subdivided into *ayil okmotus* (meaning 'village administration'), the local self-government units. Apart form the seven *oblasts,* the two cities of Bishkek and Osh have quasi-*oblast* status.

There are 45 *rayons* and 494 *ayil okmotus* in the country. An *ayil okmotu* unites several villages and comprises the lowest level of administration. It is accountable to representative authorities of local government (*kenesh*), which are elected by the citizens, and to the state administration of the higher (*rayon* or city) level.

In August 2005 the Kyrgyz Government announced its intention to abolish the *oblast* administration in order to come to a three-tiered administrative system consisting of national, *rayon,* and *ayil okmotu* levels.

Source: Grävingholt et al. (s. a.); RFE/RL (2005); United Coalition (2005)

execution of their control and administrative functions" (UNECE / UN-ESCAP 2004, 55). One of the most relevant reforms for this study is the transfer of further administrative functions to WUAs.

2.3.1 Governmental water management organizations

The Kyrgyz administrative system relevant for this study is characterized by a dual structure: The regional subdivisions of administration directly depend on the president, whereas the water management administration is subordinate to the Ministry of Agriculture, Water Management and Processing Industry (MAWMPI) (cf. Figure 4; for a general overview of the Kyrgyz administration system, cf. Box 6).

President and parliament

On top of the hierarchy, the president and parliament exercise mainly regulatory and programmatic functions in the water sector. Parliament is responsible for the legal framework regulating the management of water resources and determining the tariffs for water abstraction. The president is also involved in the legislative process. His main task is to define the

country's water policy. He is supported by the National Committee on Water Strategy, a think tank of scientists and water professionals.

Ministry of Agriculture, Water Management, and Processing Industry (MAWMPI)

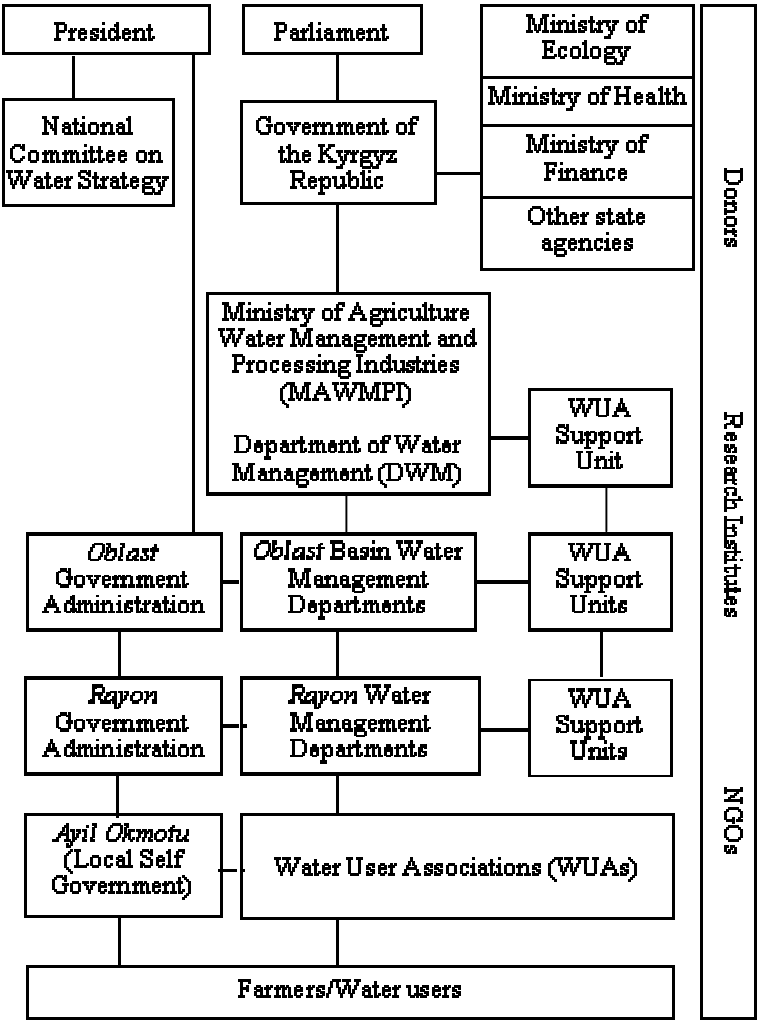
The former Ministry of Water Economy was merged with the Ministry of Agriculture to form the Ministry of Agriculture, Water Management and Processing Industry (MAWMPI). Within the MAWMPI, the Department of Water Management (DWM), the former Ministry of Water Economy, takes the lead in irrigation management, whereas the Department for Rural Water Supply is responsible for rural drinking water supply. The DWM has financial and institutional autonomy. It sets water consumption standards and limits and submits annual proposals on tariffs for water supply to the parliament. Its task is to plan and finance measures related to water management, such as improvements in efficient water management or rehabilitation of infrastructure. Together with its subordinate water management organizations, the *Oblast* Basin Water Management Departments (*OblVodKhozes)* and the *Rayon* Water Management Departments (*RayVodKhozes)*, the DWM is the main executive body responsible for water management (UNECE / UNESCAP 2004, 37).

Water Management Departments at the oblast *and* rayon *levels*

At the *oblast* level, there are six ***OblVodKhozes,*** formed in 1997. Besides distributing water to the *rayons*, they have mainly supervisory functions, controlling the water management of the *rayons* situated in the respective *oblast*. Furthermore, they are responsible for collection of data on allocation, financial requirements, and expenditures by the *rayons*.

The main task of the ***RayVodKhozes*** is to distribute water to secondary and tertiary canals and to maintain the canal system. Since 1995, Kyrgyz farmers have been obliged to sign annual irrigation water supply contracts with the *RayVodKhozes*. Today such contracts are concluded between

Figure 4: Institutional arrangement of Kyrgyz water governance



Source: Modified from Ul Hassan / Starkloff / Nizamedinkhodjaeva (2004, 9)

WUAs and the *RayVodKhozes* (Tursunaliev 2002).[18] These irrigation water supply contracts determine the annual volume and amount of water to be delivered. Since the irrigation service fees (ISF) paid by water users to the *RayVodKhoz* are too low to reach cost recovery, the remaining costs are covered by the government budget, based on a demand-aggregation process.[19]

At the inter-*rayon* level, there are two different ways of managing shared canals: In the Chui and Talas *Oblasts*, there are inter-*rayon* water management organizations, which are subordinate to the respective *OblVodKhozes*. In Osh *Oblast*, relations between *rayons* responsible for the management of common canals are regulated by contractual agreements (Ul Hassan / Starkloff / Nizamedinkhodjaeva 2004, 14 f.; Chemonics International 2003, 28).

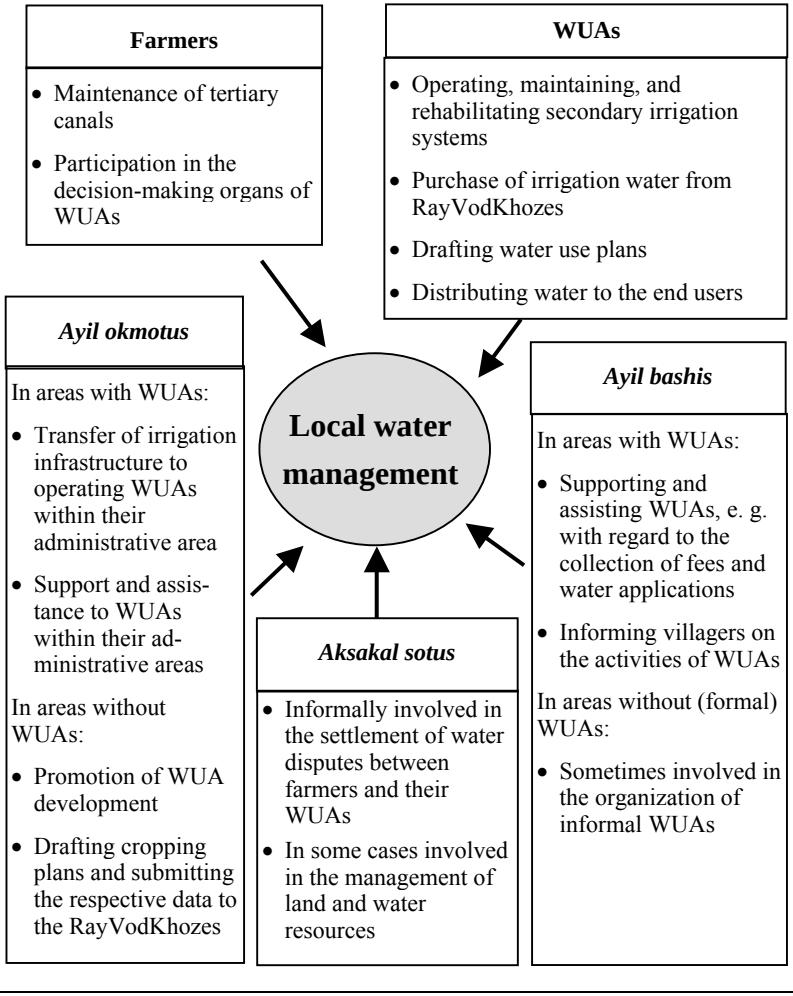
WUA Support Units (WSUs)

Within the MAWMPI, the *OblVodKhozes* and the *RayVodKhozes*, the Kyrgyz government, supported by international donors, has established WUA Support Units (WSUs) staffed with small teams comprising a WUA support specialist, a water management specialist, and an engineer. At national level, the WSU is responsible for technical assistance and training of instructors, who are supposed to strengthen existing WUAs and promote the creation of new WUAs. The *oblast* WSUs are charged with a long-term program for WUA development as well as with supporting WUAs in determining their financial and technical needs. The *rayon* WSUs are being established to assist WUAs in becoming legally registered and to provide training courses (Johnson III / Stoutjesdijik / Djailobayev 2002, 1f.).

18 Exceptions to this rule are places where WUAs do not yet exist. Here farmers are still required to sign a contract for water delivery directly with the *RayVodKhoz*.

19 The *RayVodKhozes* estimate the financial requirements for the year to come and submit them to the *OblVodKhoz*, where the financial demands are aggregated, including their budget needs. This financial requirement is then submitted to the MAWMPI, which aggregates all demands from *oblast* level, includes own requirements, and submits them to the Ministry of Finance. Financial allocations are made on the basis of resource availability , following the hierarchies of the administrative units (DFID 2003, A–24).

Figure 5: Stakeholders involved in local water management



Source: Own compilation

Box 7: The potential of Kyrgyz WUAs for promoting IWRM principles

The potential of Kyrgyz Water User Associations for the realization of the IWRM concept can be depicted along the three pillars of the IWRM Pyramid:

Ecological integration

Hydrological boundaries: The principle of managing water resources along hydrological boundaries is enshrined in the 2002 Law on WUAs. The service area of the latter is supposed to be based on hydrological units, which are considered as indivisible and have to be managed as an entity.

Water quality and water quantity: Responsible for ensuring rational water use and preventing water pollution, WUAs have an important role to play in avoiding water losses and safeguarding water quality at local level.

Water-land interaction: Ideally, WUAs should promote new irrigation techniques among farmers and undertake measures to "*prevent soil erosion and salinity"* (Kyrgyz Republic 2002, Art. 4). Their work is thus directly related to the issue of water-land interaction.

Sectoral integration

Integration of economic externalities: A central objective underlying the transfer of irrigation management to WUAs is to establish financially self-reliant water service providers responsible for the operation, maintenance, and rehabilitation of tertiary irrigation infrastructure. By promoting WUAs, the Kyrgyz government has thus taken an important step towards cost recovery.

Integration of social effects: Ideally, WUAs should ensure the "*fair and equitable distribution of irrigation water among all WUA members*" (Kyrgyz Republic 2002, Art. 4). The social dimension of water utilization is thus explicitly taken into account in the Kyrgyz WUA approach.

Regulatory integration

Decentralization and participation: In contrast to the highly centralized top-down management in Soviet times, the WUA approach clearly constitutes a shift towards decentralizing water management. By participating in WUAs, Kyrgyz farmers can become active in decision-making on local water management. Aiming at enforcing water users' participation, this principle is explicitly called for in the 2002 Law on WUAs. It is widely believed that participatory forms of irrigation management not only enhance farmers' ownership but also lead to improvements regarding service provision.

Information: In charge of drafting water use plans, WUAs are expected to communicate water needs to the *RayVodKhozes*. As in the framework of ongoing donor projects, WUAs are increasingly being equipped with measurement devices (e. g. IWRM Ferghana Valley project), efforts are also currently being undertaken to promote information on individual water use within the WUAs' service areas.

Furthermore, WUAs have the task of providing information and training to their members.

Demand management: By maintaining irrigation infrastructure, WUAs contribute to the prevention of water losses. In addition, the responsibility of WUAs to ensure rational water use and prevent the overwatering of irrigated fields also demonstrates the role they could play in enhancing the IWRM principle of demand management.

Source: Modified from Kyrgyz Republic (2002); Svendsen / Trava / Johnson III (1997, 10 f.).

2.3.2 Local organizations involved in water governance

Actively promoted by the Kyrgyz government, WUAs now appear to be the primary stakeholders responsible for water management at the local level. Yet this impression is only partly true, since there are a range of other actors that deal with water management (cf. Figure 5).

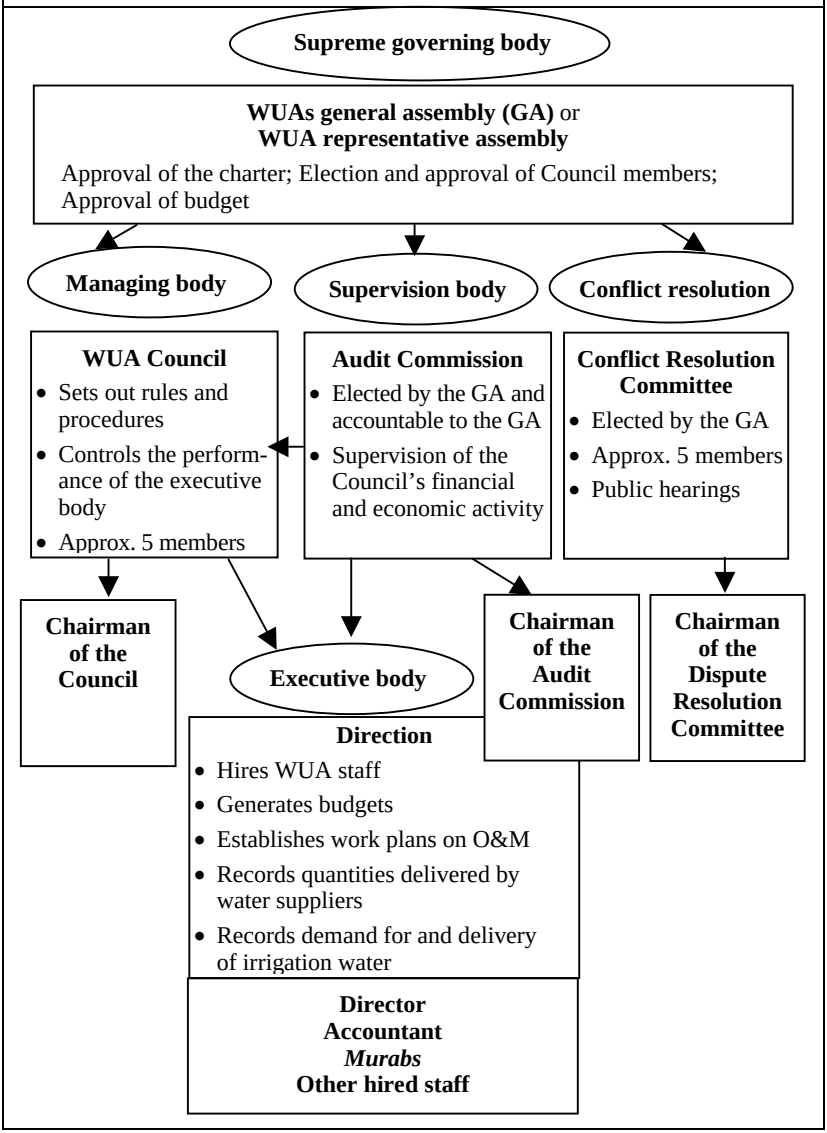
Water user associations (WUAs)

Introducing WUAs was one of the most important reform steps in the Kyrgyz water sector, as they have great potential for the promotion of IWRM principles (cf. Box 7). At present, there are about 420 WUAs in Kyrgyzstan, 387 of which are officially registered, the rest currently in the process of registration. The number of both registered and unregistered WUAs is rising continuously. By the year 2010, the government aims to have established 500 WUAs, which should then encompass all irrigated land (Chemonics International 2003, 29). While in the Chui *Oblast* 102 WUAs cover approximately 65 % of all agriculturally used land, in the Osh *Oblast* 74 WUAs have been created so far, 72 of which have registered formally. The latter already cover about 72 % of irrigated land.

The organizational structure of a WUA as per the 2002 Law on WUAs is depicted in Figure 6.

In addition to formally registered WUAs, in some, mostly remote mountainous areas, informal WUAs have taken over the management of water resources. The breakup of former state farms and the resulting need to operate and maintain former on-farm irrigation systems has fostered the

Figure 6: Organizational structure of WUAs as set out in the 2002 Law on WUAs



Ideally, a WUA is set up by a founding committee, which drafts the WUA's charter and defines its service area. The founding committee then convokes the first general assembly (GA). The GA is viewed as the supreme governing body. It consists of either all farmers who own or lease a plot of agricultural land within the WUA service area, or of elected representatives. The GA's role is to approve the WUA's budget and work out plans and define the main direction of its overall activities. Since in the past power tended to be concentrated in the hands of the WUA's executive and/or managing organs, the law explicitly states that the decision-making power of the GA cannot be delegated to any other organ. The WUA Council, with the chairman at its head, is the WUA's management body and controls the performance of the WUA's executive organ. Its activities are supervised by an Audit Commission, which is elected by the GA. The WUA direction and its staff perform executive functions. Their tasks include registering members and non-members, drafting budgets, elaborating plans for operation, maintenance, and water use, recording irrigation requests and controlling water delivery by the water supplier. Furthermore, the law provides for the setting up of a conflict resolution committee, whose function is to settle water conflicts among users.

Source: Modified from IWMI / Scientific Information Center ICWC (2003, 20 f.), Kyrgyz Republic (2002, Art. 5 f.)

spontaneous creation of these informal associations (DFID 2003, 3–4; Johnson III / Stoutjesdijik / Djailobayev 2002, 7). The WSUs are now undertaking measures to formalize them through registration.

*Local self-government (*ayil okmotus*)*

Established in 1996, the local self-government executive bodies (*ayil okmotus)* are primarily responsible for economic and social development at local level. *Ayil okmotus* encompass village clusters comprising up to seven villages and often covering the territories of former state and collective farms (cf. Box 5). With agriculture the most important source of income in rural Kyrgyzstan, *ayil okmotus* are heavily concerned with agricultural issues, including the administration of the ALRF.

The *ayil okmotu's* role in water management is due to the fact that prior to the introduction of WUAs, the irrigation network (i. e. secondary and tertiary canals and drains) was initially transferred to them. *Ayil okmotus* now have to hand over irrigation infrastructure to registered WUAs within their administrative areas. This transfer is backed by the recently adopted Water Code.

In areas with operating WUAs, *ayil okmotus* often provide support and assistance to WUAs and thus deal only indirectly with water management. In areas without WUAs, they are more directly involved in water management. In these cases, a water and agricultural management specialist within the *ayil okmotu* not only provides farmers with advice on the cultivation of crops but also helps them to plan their water needs. The data are then submitted to the *RayVodKhozes* (Giovarelli / Akmatova 2002, 4 f.; Johnson III / Stoutjesdijik / Djailobayev 2002, 5; Sehring 2005, 26–27). In many cases, regardless of whether a WUA exists or not, the *mirabs* are employed by the *ayil okmotus*.

Together with the *ayil okmotus,* the position of village heads (*ayil bashis*) was established in 1996. *Ayil bashis* facilitate the management of villages within *ayil okmotus*. They are either appointed by the *ayil okmotus* or directly elected by the village councils *(ayil kenesh)*. Like the *ayil okmotus*, the *ayil bashis* deal primarily with questions related to agriculture and provide assistance to WUAs, but they sometimes also interfere with water management.

Other actors involved in water management

In addition to the above-described formal organizations, other actors also play an important role in local water management in Kyrgyzstan. The most important of them is the traditional court of elders (*aksakal sotu*), which gained importance after independence. In 1995, *aksakal sotus* were granted the status of formal organizations. The *akskal sotus* consist of about five persons, mostly respected elders of the community. Usually there is an *aksakal sotu* in every village, but in the case of smaller *ayil okmotu* there may be only one for the entire *ayil okmotu.* Depending on their influence, *aksakal sotus* may also deal with land and water management. *Aksakal sotu*s are particularly relevant when it comes to the settlement of conflicts between WUAs and farmers or among farmers (Giovarelli / Akmatova 2002, 5 f.; Sehring 2005, 21).

Part B: Analysis of Kyrgyz water governance

3 Ecological integration

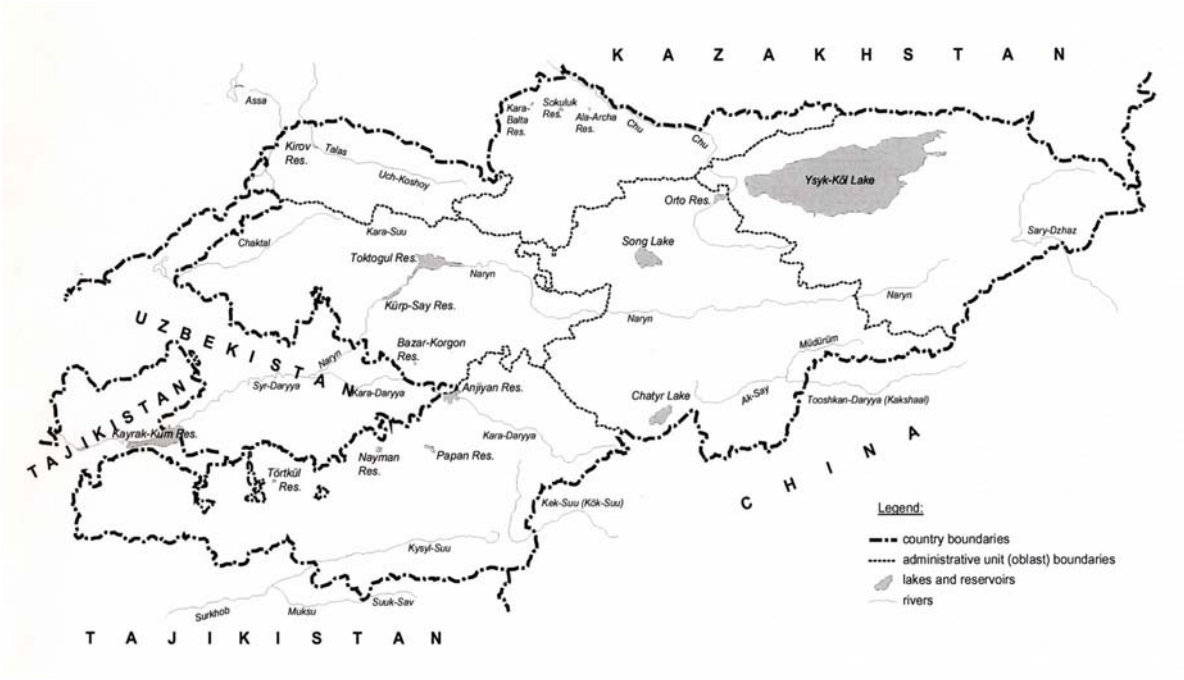
The aim of the following chapter is to assess the integration of eco-systematic interdependencies in Kyrgyz water management. Thus three main aspects will be analyzed. First, the structure of Kyrgyz water management will be compared with the hydrological boundaries in order to examine to what extent these two dimensions correspond (3.1). Second, the integration of quality aspects into the supply of sufficient quantities of water will be analyzed (3.2). A third subchapter will present and discuss the interdependencies between water and land use and the way these interdependencies are handled by water managers (3.3). IWRM explicitly requires that this interaction be taken seriously into account and that measures be undertaken to prevent negative consequences, if necessary.

3.1 Hydrological boundaries

In analyzing hydrological boundaries in Central Asia, one is in fact forced to consider the whole dimension of the Aral Sea Basin, the main catchment area in the region. The Aral Sea Basin stretches from most parts of Turkmenistan, Tajikistan, and Uzbekistan, over the southern parts of Kazakhstan and central and southern Kyrgyzstan to northern Afghanistan and Iran. For practical reasons, the authors decided against this approach, and the study was limited to the national territory of Kyrgyzstan. Within national water governance, a closer look is taken at the three most important layers of water management: the *oblast*, the *rayon*, and the local level.

Due to topographic conditions, Kyrgyz hydrology follows a distribution that divides the country into two hydrological zones: first, the flow generation zone in the mountainous regions of Tien Shan and Pamir-Alay, representing 87 % of the country's total surface, and second, the flow dissipation zone, which corresponds to the main valleys and plains, covering only 13 % of the territory (FAO AQUASTAT 1997). The flow generation zone comprises the principal areas of precipitation and water (or snow) accumulation, the elevated and sparsely populated regions of the country. In contrast, the flow dissipation zone covers the major populated areas in the north (Chu and Talas valleys) and the Ferghana Valley in the

Figure 7: Hydrographical map of Kyrgyzstan



Source: UNECE (2000, 70)

Table 1: Major river basins in the Kyrgyz Republic

Water-shed *(Main Tribu-taries)*	Region	Part of Territory (%)	Internal RSWR* (km³/year)	Outflow to	Quantity Reserved for Other Countries (km³/year)	Quantity Available to Kyr-gyzstan (km³/year)
Syr Darya (Naryn & Kara Darya)	Central/ West	55.3	27.25	Tajikistan & Uzbeki-stan	22.33	4.92
Chu, Talas & Assa	North	21.1	6.83	Kazakh-stan	2.03	4.80
South-eastern	Southeast	12.9	6.18	China	–	6.18
Lake Issyk-Kul	Northeast	6.5	1.50	Interior basin	–	1.50
Amu Darya (Kysyl-Suu)	Southwest	3.9	1.93	Tajikistan	1.51	0.42
Lake Balkhash (Ili)	Northeast	0.3	0.36	Kazakh-stan	–	0.36
Total		100	44.05		25.87	18.18

*RSWR=Renewable Surface Water Resources

Grayed fields mark the watersheds which are of special interest for this study since they comprise the areas on which it focuses

The total quantity available to Kyrgyzstan does not correspond to the above-mentioned 11.6 km³/year (cf. Box 2) because it includes runoff to China and Lake Balkhash in Kazakhstan that is not regulated by international treaties. Since this runoff occurs in rather remote mountainous areas, Kyrgyzstan is not able to use these water resources

Source: Modified from FAO AQUASTAT (1997)

southwest, which are the natural centers of water discharge. They also constitute the principal economic centers of the Kyrgyz Republic.

Kyrgyz surface water resources can be divided into six major river basins, which are summed up in Table 1. The geographical location of the main rivers and lakes in Kyrgyzstan is illustrated in Figure 7.

As shown in Table 1, two major river basins, the Syr Darya Basin and the Chu, Talas, and Assa Basins, account for more than three fourths of renewable surface water resources. Both also include the main urban settlements Bishkek, Tokmok, Kara-Balta, Talas, Osh, and Jalal-Abad as well as rural areas with relatively high population densities. Large parts of these river basins correspond to the major agricultural areas and have outstanding importance for the Kyrgyz economy. At the same time, treaties committing water resources to neighboring countries have meant that these two river basins face the greatest restrictions concerning internal water use (cf. Box 8).

3.1.1 Management structure and hydrological boundaries

There is a clear will in Kyrgyz politics to shift water management away from administrative and to hydrological boundaries. The new Water Code states that water management must be *"undertaken within the boundaries of the principal basin in accordance with hydrographic principles, which relate to Lake Issyk-Kul and the main rivers of the Kyrgyz Republic"* (Art. 5). What follows will assess the extent to which this creed is already being put into practice.

Box 8: International water management

The two Soviet inter-republic water management bodies (in Russian: BVOs – Basin Water Associations, one responsible for Amu-Darya, one for Syr-Darya) have been integrated into the 1991 Interstate Coordination Water Commission of Central Asia (ICWC), which is based in Tashkent/Uzbekistan. This organization is generally considered as the most relevant actor in regional water distribution. The Soviet quota system for water distribution between the different republics still serves as the basis of its work. At meetings held twice yearly, the Commission's members decide about the actual amount of water each country has the right to extract from the transnational rivers. However, the enforcement of these agreements remains weak, because there are no generally accepted rules for water distribution. Especially in dry years, conflicts among the member states are frequent.

Experts stated that the ICWC's functioning depends to a large degree on continuity of personal memberships since most members had for the most part already occupied their positions in Soviet times. Apparently, personal contacts play an important role in finding agreements. It seems that at the international level water is mainly managed in informal bilateral ways that sometimes limit the formal body to state well-sounding programs and taking notes of meetings. Regularly, direct interventions of high state representatives like vice-prime ministers are necessary to find agreements at all. These difficulties result mainly from largely different use patterns in the region's upstream and downstream countries.

Source: Own compilation, field research

Below the national level, the next administrative bodies are the *Oblast* Basin Management Departments (*OblVodKhozes*). The term 'basin' in the organizations' name was introduced recently and was not accompanied by any shift of competencies or service areas. Nevertheless it has to be acknowledged that Kyrgyz *oblasts* correspond more or less to hydrological boundaries, even if this is mainly because of geographical particularities. Two exceptions are the *oblast*-crossing rivers Chu and Naryn. The second reason for the approximate congruence of *oblasts* with hydrological units is the planning of canal construction in Soviet times. All big canals were built within one *oblast,* without crossing the borders to another. This spares today's Kyrgyz water managers the trouble of distributing water between different *oblasts*.

At *rayon* level the situation is more difficult. Kyrgyz *rayons* are not structured in keeping with hydrological boundaries, they exclusively follow administrative ones. This creates considerable problems, as the *Ray-*

VodKhozes are key organizations in Kyrgyz water management. Their service areas, in combination with their great relevance for equal water allocation to users, constitutes a noteworthy hurdle on the way to implementing IWRM. Some *RayVodKhozes* have no water source of their own, a circumstance that constitutes a big problem regarding the reliability of water provision to the WUAs on their territory.

The research found indications of a further subdivision within the *rayons*, which is reported to be more of a technical nature. Two *rayons* within the research area were composed of several so-called irrigation management units (*upravleniye oroshaemyh sistem*, UOS). Each of these entities comprises one small hydrological unit, since they are structured in relation to the source of their water resources; if one *rayon* receives its water from two rivers and two big canals, it consists of four UOS. UOS are in charge of maintenance of infrastructure as well as the operational elements of water distribution. In regions where no WUAs exist, they have additional significance as direct contact points for water users. However, it is not clear whether this management structure exists everywhere or only in parts of northern Chui *Oblast*.

At the local level, WUAs are the most important actors because they are promoted by the Kyrgyz government and receive strong financial support from international donors. One main principle for their formation is that they comprise one hydrological unit. This means at the local level that they cover all fields receiving water from the same source. It was found, however, that in contrast to official statements, the factors that determine WUA service areas are manifold. Even though some WUAs seem to respect hydrological boundaries, many examples were found where WUA territory was determined by village frontiers, *ayil okmotu* borders, the structures of old *kolkhozes*, machine delivery stations, or study farms. This results in various problems like the availability of water in downstream WUAs or disputes over responsibility for rehabilitation measures in shared infrastructure (cf. Box 9).

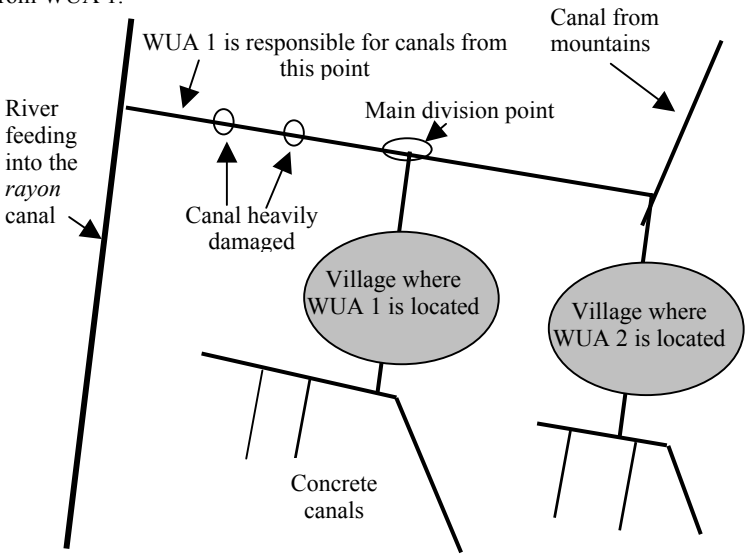
Nevertheless, the will to adjust management structures to hydrological boundaries is especially marked at the local level. Amalgamating WUAs with a view to having them cover one complete secondary or even primary canal is a process currently ongoing in Kyrgyzstan. In the Aravan *rayon* in southern Osh *Oblast*, the number of WUAs has already been reduced through such mergers from 50 to 14 in the course of recent years.

Box 9: Case study: consequences of disregarding hydrological boundaries

This case study takes a closer look at two WUAs located in the Panfilov *rayon* – one situated upstream (WUA 1), the other downstream (WUA 2). As they share one canal, both WUAs operate within the same hydrological unit. The aim of the case study is to highlight inefficiencies of local water management resulting from the disregard of the IWRM principle of managing water resources along hydrological boundaries.

Background: The system of water exchange between WUA 1 and WUA 2

In spring, autumn, and winter, downstream WUA 2 manages to cover its water supply through its own canal, which is fed from the mountains. However, since in summer, the latter often does not deliver sufficient water, WUA 2 frequently suffers from water scarcity. In contrast, located near the intake structure, upstream WUA 1 usually has abundant water resources throughout the year. With a view to resolving its water scarcity problems, downstream WUA 2 has started to buy water from WUA 1.



Given that its water needs can usually be satisfied by the canal fed directly from the mountains, WUA 2 pays no fees to the *RayVodKhoz*. Yet for the water provided by WUA 1, it pays a fee of 3 *tyiyns*.

Interestingly, while the *RayVodKhoz* is only in charge for the maintenance of the intake structure, WUA 2 is nevertheless officially required to submit to the

RayVodKhoz an application for water to be delivered by WUA 1. However, both WUAs appear to ignore this regulation, which they consider as unnecessary, and instead to arrange water allocation between themselves.

Conflicts over water

While at first sight the arrangement between the two WUAs seems to work quite well, conflicts over water occur frequently: First meeting its needs from the canal, upstream WUA 1 does not always provide enough water to cover the water needs of downstream WUA 2. Water scarcity negatively affects agricultural productivity in village 2, thereby contributing to an overall lower standard of living of its villagers. Perhaps as a consequence, members of WUA 2 sometimes serve themselves from WUA 1's part of the canal without paying for the water, thereby further aggravating the conflict.

Lack of collaboration

Another problem is related to the maintenance and rehabilitation of shared parts of the canal. As both WUAs depend on its good maintenance, canal rehabilitation work should, ideally, be carried out in collaboration. However, while one part of the canal (i. e. from the intake structure to the main division point near village 1) is managed by WUA 1, the other part (from the main division point to village 2) is looked after by WUA 2. Currently both parts of the canal are in quite bad condition. This is due to several factors: First, to water users, who sometimes deliberately break holes in the canal and remove water illegally; second, to the situation of scarce financial resources that both WUAs are suffering from; and third, to a lack of accountability and misappropriation of funds by WUA staff. For instance, one of the WUAs received credits to rehabilitate its part of the canal, but the money allegedly went into the pocket of the WUA director.

Possible solution

In order to make water management more efficient and to reduce conflicts over water, efforts are now being undertaken (e. g. through the *ayil okmotu*) to unite all WUAs which share the same canal. The negotiations with the WUAs and the *RayVodKhoz* are currently in progress.

Whereas the director of WUA 1 has a positive attitude towards this unification, WUA 2 is rather reluctant. Upstream WUA 1 perceives the unification as a chance to *"leave the dominion of the RayVodKhoz*" and to avoid having to pay for water. Since after unification they would no longer have to rely on state infrastructure, WUA members would only have to pay for the provision of services. In contrast, downstream WUA 2 is strongly opposed to the idea of WUA unification. It fears discrimination in water allocation because it would lose influence in the course of WUA unification.

Source: Own field research

New developments and perspectives

As mentioned above, the new Water Code, the major policy statement of the (former) government in the water sector, includes explicitly a far-reaching shift towards the principle of hydrological boundaries. The Code introduces a new organization called National Water Council, comprising *"the heads of ministries, administrative agencies and other state bodies that are responsible for aspects of water resource management including financial and security aspects"* (Art. 9). This council will mainly be in charge of coordinating the different state bodies as well as developing regulations for the implementation of the Code. There will also be Water Councils at basin level, with similar composition and tasks. The establishment of these councils is surely a positive signal towards an IWRM-oriented water management, especially as it includes non-agricultural users, which has been rare until now. Nevertheless it remains to be seen how the councils will perform their tasks. The legal provision requiring (at least) yearly meetings gives little reason to expect too much as regards effective coordination. Furthermore, no such organization is provided for at the local level of administration, and there is still a need to clarify competencies between several of the state bodies involved.

An additional step towards a hydrology-oriented management includes the establishment, by the new Water Code, of Irrigation and Drainage Commissions. These commissions will be introduced at national, basin, and local level. They comprise representatives from the State Water Administration, from the territorial bodies, and from irrigation water users. Among others, their tasks are "*to review the performance of relevant irrigation and drainage systems; to supervise the implementation of recommendations made; to act as a forum for information exchange; and to advise on issues that shall be their competence*" (Art. 79). These competencies actually limit the Irrigation and Drainage Commissions to the role of a purely consultative body without any executive power. Furthermore, the relation between the Irrigation and Drainage Commissions and the Water Councils is not clear, and care should be taken not to establish parallel structures at the national and basin levels.

The concept of WUA federations is completely lacking in the new Code. These federations, which are seen by many experts as the next logical step to shift Kyrgyz water management towards hydrological units, should comprise all WUAs sharing one primary canal. In contrast to the Irrigation

and Drainage Commissions, they will possess executive bodies and permanent staff, and thus be able to manage water resources on their own. This raises the question as to their future relations with the *RayVodKhozes*. International donors, who are the driving force behind the establishment of WUA federations, aim at dismantling the *RayVodKhozes* in the long run and replacing them with these new participatory organizations. Transferring tasks currently performed by state administration to new private organizations has led to skepticism within the administration. Interviewees from the administration frequently emphasized that it will take time until WUA federations are able to perform the tasks of the *RayVodKhozes*. This is surely true – thus far only one WUA federation has started working – but it will be imperative for implementation of IWRM to further support the creation of WUA federations and to enable them to manage whole canals, respecting hydrological boundaries. The interests at stake that serve to impede this difficult change within the organizational structure will be analyzed in more detail in Chapter 5.1.1.

Possible improvements / Recommendations

With regard to the ambiguous picture shown above, the main recommendation is to further support the shift away from traditional water management to basin management.

— Recommendation to the Kyrgyz government: **Apply the 'basin approach' consistently, also at the canal level, by supporting the process of federating WUAs.**

  In order to adjust management structures to hydrological boundaries, the shift towards hydrological units has to be implemented at all administrative levels.

— Recommendation to the Kyrgyz government: Continue consistently to pursue this approach and **dismantle the *RayVodKhozes* in the long term.**

  In order to avoid duplications of functions, the competencies of *RayVodKhozes'* must be handed over to WUA federations over the long term.

— Recommendation to international donor organizations: **Continue to support WUAs in order to improve their management capacities and enable them to federate.**

As regards the major relevance of donors for Kyrgyz water management, the former have considerable potential to initiate institutional change through the promotion of WUAs, which have the potential to become relevant change agents.

3.1.2 Groundwater – surface water interaction

Another dimension of hydrological boundaries that is often underestimated is the interaction between ground- and surface water. The fact that hydrological boundaries also have a vertical dimension is widely ignored in Kyrgyz water management. Not only is the administration of both water sources strictly separated, there is also a lack of awareness among water managers of the interaction between ground- and surface water. This situation is due to differing use patterns: while surface water is mainly used for irrigation agriculture, industrial and drinking water is supplied from groundwater resources. From a quantitative point of view, the situation is clear: About 95 % of all water used in Kyrgyzstan is surface water.

Problems arise from the fact that this strict separation is a mere fiction. According to an expert from the Ministry of Ecology and Emergency Situations (MEES), about 700,000 people of a population of 5 million have no access to clean drinking water. Many of them provide themselves with water from irrigation canals. The health consequences of this practice are presented in Chapter 4.3.2. Further problems result from the use of drinking-water infrastructure for irrigation purposes (cf. 4.2.1) and inappropriate irrigation practices, which lead for instance to rising groundwater tables (cf. 3.3.1).

Due to partly overlapping use patterns, it is necessary to ensure a maximum of cooperation and coordination between the different administrative bodies. The complete absence of cooperation, exacerbated further by a lack of communication structures between the ministries concerned, constitutes a major managerial problem for current water management. The establishment of Water Councils by the new Water Code at national, basin, and canal levels thus appears to be an appropriate step in the direction of a water management in conformity with IWRM.

Possible improvements / Recommendations

The strict separation of tasks within the Kyrgyz water administration is the central problem for the integration of groundwater-surface water interaction.

— Recommendation to the Kyrgyz government: **Improve cooperation between the state organs of surface water management (DWM, MEES etc.) on one side, and the State Sanitarian and Epidemiological Body and the Ministry of Geology on the other.**

  The formal path to improving this cooperation is already given by the new Water Code – the National Water Council. It is desirable that this Council should become an effective coordination mechanism.

3.2 Integration of water quantity and water quality

This section deals with the question of whether and to what extent the interaction between water quantity and water quality is taken into consideration in Kyrgyz water management. Traditional supply management had a strong focus on quantity, i. e. supplying enough water to users. The fact that poor quality diminishes the benefits of water was generally not considered. With regard to the former practice of water allocation, the task for a water management in line with IWRM is thus the integration of quality aspects into the provision of sufficient quantities of water.

Thanks to Kyrgyzstan's upstream position, the country's water quality is in fact much better than that in neighboring countries. However, big differences exist between the regions with low population density and the densely populated areas, especially the Chu river valley and the Ferghana Valley. In these regions, which are also centers of agricultural and industrial production, pollution with nitrates, nitrites, oil and grease, phenols, and pesticides constitutes a sizable problem. At various locations surface water is severely contaminated by residues from mining activities and mine tailing dumps. This contamination is primarily due to heavy metals, cyanide, and radioactive substances stemming from uranium mines. There are reported cases of groundwater pollution by infiltration from contaminated surface water (UNECE 2000, 73 f.).

Box 10: Inappropriate use of fertilizer

Chicken manure is a very effective organic fertilizer. In addition, it is more affordable for Kyrgyz farmers than mineral fertilizer, which has to be imported. Used with adequate irrigation techniques like drop-irrigation, chicken manure can be a helpful measure to increase the fertility of land. Applied in excess and improperly, it constitutes an ecological danger. The present study found one case in the northern Sokuluk *rayon* where farmers applied untreated chicken manure by simply mixing it with irrigation water. They applied fertilizer at the same time as they were watering their fields. However, the common practice of over-irrigation makes it very difficult to apply only the necessary amount of fertilizer – overuse is nearly inevitable. The excess manure runs off into water bodies, raising their level of nitrate and thus contributing to eutrophication.

Source: Own compilation

One of the focuses of interest of the present study is quality problems caused by agricultural pollutants. According to the Ministry of Ecology and Emergency Situations, the organization responsible for monitoring and quality control, drainage water constitutes the main source of pollution, together with untreated sewage water from settlements. Drainage water often has a high content of nitrates and pesticides as well as high salinity. The main problem involved in assessing water quality in Kyrgyzstan is the lack of exact information about pollution levels as well as on the use of agrochemicals and organic fertilizer, which are often used in abundance (cf. Box 10). There is no doubt that after the collapse of the Soviet Union the use of agrochemical inputs in the agricultural sector declined by about 75 % (UNEP / GRID 1999). It remains unclear, however, to what extent the recovery of agricultural production during recent years has been due to increased use of fertilizers and pesticides.

Nevertheless, agrochemicals as such are not the main cause of pollution, provided they are employed appropriately. Inefficient irrigation and drainage practices as well as soil erosion are the most relevant factors for agrochemical filtration into water bodies (UNECE 2000, 117). The main problem is the inappropriate use and the infrastructural decay of the Kyrgyz agricultural sector. Drainage water often flows back to irrigation canals and is then used again for irrigation. This causes salinity and pollution levels to rise downstream.

Furthermore, several interviewees emphasized the importance of livestock raising as a pollution source, especially for groundwater resources. As livestock density is highest near human settlements, this represents a danger especially to drinking water quality, and thus to human health (cf. 4.3).

Sewage water from settlements and factories is seen as an additional problem for water quality in Kyrgyzstan. Although the majority of urban settlements are equipped with treatment plants, most of them do not function appropriately at their nominal capacity or are not operational at all. About 90 % of rural settlements lack sewage systems or other individual facilities such as septic tanks etc. (UNECE 2000, 77 f.). The national report on the environment states that although industrial production has decreased by one half since independence, *"the volume of pollution into waterways and reservoirs on main indices is increased: oil products – 2 times, nitrates – 3.4 times"* (Kyrgyz Republic/Ministry of National Environment Protection 2000). This contradictory tendency is due to the massive deterioration of infrastructure. According to the Ministry of Ecology and Emergency Situations, the expected further increase in mining activities will affect water quality very negatively.

3.2.1 Management of water quality

Integration of water quality aspects into water supply remains weak in Kyrgyzstan. The focus of water managers is clearly on how best to provide a sufficient quantity of water. Integration suffers mainly from a lack of problem awareness among both water managers and farmers.

In the course of the research for the present study, statements praising the very good quality of Kyrgyz water resources were frequently expressed by interviewees at different levels of Kyrgyz water management as well as by WUA staff. Unfortunately, such statements are only partly true, but they nevertheless provide a good insight into how water quality issues are perceived and treated by Kyrgyz water managers. Generally, ecological problems are not perceived as pressing issues for Kyrgyz water management. Water managers more or less ignore them due to the fact that these problems are – relatively – smaller than those encountered in neighboring countries. This perception of ecological problems leads to a focus on quantity aspects, as stated by an employee of the MEES: "*The problems*

are all decided only from one side. It is always looked on from the water-taking side."

This statement reflects the strict separation of tasks between the MAWMPI, which is in charge of regulating water abstraction, and the Ministry of Ecology and Emergency Situations, which deals with regulating water pollution. Ignorance of the relevance of ecological issues throughout all levels of Kyrgyz water management constitutes a major obstacle to the introduction of IWRM.

At farm level the situation is similar. There is a general lack of know-how about the ecological consequences of agricultural work in combination with the Soviet tradition of overuse of agrochemicals and organic fertilizers. This poses problems for attempts to make people aware of water quality issues, even when rural families are directly affected by reduced water quality, due for instance to saline drinking water.

Possible improvements / Recommendations

In order to improve the poor managerial integration of water quality aspects into water management, the following steps are recommended.

— Recommendation to the Kyrgyz government: **Assure a maximum of cooperation and communication between the Department of Water Management (DWM), i. e. the future State Water Administration, and the MEES.**

  With regard to the remaining separation of tasks between the competencies for water abstraction and water pollution, collaboration between the two state bodies involved is key to making water quality aspects heard in water management.

— Recommendation to the WSUs: **Provide trainings with a focus on securing water quality to WUAs.**

  As important multipliers, WUAs should be involved in informing farmers how to avoid overuse of fertilizer, etc.

— Recommendation to agricultural extension services: **Include in trainings information about the consequences of agricultural activities on water quality.**

Awareness for sustainable land use is largely lacking among farmers. Agricultural extension services should inform farmers directly about eco-systemic interdependencies.

3.2.2 Legal provisions on the protection of water quality

The new Water Code considerably strengthens the protection of water quality. The introduction of ecological provisions was one of the big points at issue during the Code's two-year preparation period. This dispute reflects the general cleavage between classic '*vodniki*' (supply-oriented water managers) and ecologists. While the former emphasize the good water quality in Kyrgyzstan and the existence of standards, even though some of these standards date from Soviet times, the latter point to local problems and complaints from the Kazakh neighbors about polluted water in the Chu river. In the end, the Code introduced several new provisions designed to protect water quality. It, for instance, assigned to the MEES the right to define "*maximum limit values for the discharge of pollutants and wastes to water bodies*" (Art. 51). The same article reintroduced provisions for the treatment of sewage and waste prior to their discharge into water bodies.

Furthermore, the future State Water Administration is authorized to specify water protection areas and regulate economic activities in these areas, the purpose being to minimize the diffusion of pollutants into ground water sources. In addition, water protection zones will be created adjacent to or near water flows; these will have relatively strict provisions governing their permitted use. In these areas livestock farming, the use of pesticides and fertilizers, the storage, processing, or disposal of waste, construction activities, and specified industrial activities will be prohibited.

According to an expert from the Kyrgyz NGO 'Sustainable Use of Natural Resources,' the MEES and Kyrgyz environmentalists were not completely satisfied with the Code, although they do accept it. Thus the crucial point will be its implementation.

Enforcement

Despite the considerable improvements brought about by the new Water Code, ecological questions still remain no more than weakly embedded in Kyrgyz water management. Due to lack of awareness as well as insuffi-

cient monitoring capacities and procedures, it will prove difficult to implement the ambitious legislation.

Under the new Water Code, ecological competencies remain split up between several state bodies, in particular the State Water Administration, the Ministry of Ecology and Emergency Situations, and the State Sanitarian and Epidemiological Body. Bearing in mind the agricultural bias of the current DWM, it seems probable that enforcement of rules will remain problematic. For the relatively powerless MEES, *"it is hard to make people follow the standards,"* as one employee pointed out.

The general problem of enforcement of rules by the government also applies with regard to water legislation. It is common, for instance, to avoid fines for water pollution by bribing the relevant officials. Thus informal regulations play an important role in that they obstruct the implementation and enforcement of many provisions of the legislation, and are thus also an impediment to IWRM.

Possible improvements / Recommendations

With regard to the existence of legal provisions for the protection of water quality, the following recommendation is key.

— Recommendation to the Kyrgyz government: **Consistently apply enforcement mechanisms**.

  To reduce the gap between legislation and implementation, the existing mechanisms designed to punish infringements of legal provisions (e. g. fines) should be consistently applied and, if necessary, toughened up.

3.2.3 Monitoring of water quality

There is a considerable lack of information on water quality resulting from insufficient monitoring capacities for irrigation canals, and especially at the farm level. There is also no monitoring of the inputs farmers use and the way they use them. For rivers, the situation seems to be better. According to a specialist from the DWM, river water quality is measured three times each season. However, the major problem involved in monitoring water quality is the progressive deterioration of monitoring stations and equipment due to lack of funds. The pure number of functioning

monitoring stations went down from 1,478 in Soviet times to a current number of 542, according to an expert from the Institute of Water Problems. This decrease by almost two thirds is mainly due to a lack of the financial means needed for their maintenance.

An additional problem is that monitoring is done by several organizations. In general, the Ministry of Ecology and Emergency Situations is in charge of securing good water quality. But monitoring is also conducted by the Inspection Department within the MAWMPI. In addition, both the *Gidromet* agency and two other research institutes in Bishkek collect data on water quality. There seems to be very little communication between these organizations, and this makes it difficult to make proper use of the data. In particular, the research institutes need to sell their data, and this constitutes an obstacle to their use by ministries, which are generally short of funds.

Possible improvements / Recommendations

Monitoring, a basis for assuring a good water quality, needs to be substantially strengthened in Kyrgyz water management.

— Recommendation to the Kyrgyz government: **Improve the cooperation between the DWM (i. e. the future State Water Administration), the MEES, and research organizations to ensure that the data are used in the political process.**

  The current separation between spheres of responsibility of monitoring organizations reduces their effectiveness. The ministries involved should be able to buy the necessary data from research organizations or have the possibility to access them free of charge.

— Recommendation to international donors: **Support the rehabilitation of monitoring capacities for water quality at all levels.**

  Monitoring, a central aspect involved in ensuring good water quality, needs to strengthen substantially on the technical side. If IWRM is taken seriously, water quality monitoring capacities will be seen as a basis for integrating eco-systemic interdependencies into water management.

3.3 Water-land interaction

One important component of ecological integration must be seen in efforts to pay due heed to the interaction between water and land use. A common problem of water-land interaction is soil degradation, and erosion, waterlogging, and salinization are its most widespread symptoms. According to IWRM, prevention measures are essential to avoid these ecological problems, which have a very negative impact, especially on agricultural production.

In traveling through the rural landscape of Kyrgyzstan, one gets the impression that a large part of Kyrgyzstan's arable land is affected by soil degradation. However, this impression cannot be verified on the basis of current and reliable data, a fact due to a lack of monitoring of environmental problems in Kyrgyzstan. The existing data appear to underestimate the seriousness of the situation. According to the United Nations Economic Commission for Europe (UNECE), only about 7 % of irrigated land is affected by soil erosion (2000, 115). Yet other sources, including interviewed experts, estimate that up to 75 % of all agricultural land suffers from different degrees of erosion (International Fund for the Aral Sea 2003). The national report on the state of the environment states that already in 1990 10 % of irrigated arable land was salinized, and 20 % of the total area of Kyrgyzstan was affected by degradation of soils and vegetation (Kyrgyz Republic/Ministry of National Environment Protection 2000).

According to experts from the Kyrgyz organization 'Central Asian Mountain Partnership' (CAMP), the intensity of the above-mentioned indications on agricultural land differs from one field location to another. Based on the data collected, we can distinguish three zones:

— In lowlands with a very high groundwater level, waterlogging and salinization are pressing problems.

— Few problems occur in the middle stream area of rivers and canals. In the areas covered by our research, the most fertile fields are situated in this zone.

— In slope lands situated in the upstream areas of rivers and canals, the groundwater level is generally deep. Erosion is the most pressing problem in this zone, while waterlogging and salinization do not occur.

In the Kyrgyz context, soil degradation is mainly related to unsuitable land use practices. In most cases, such practices lead to a significant reduction of yields or even to total crop failure. As a consequence, revenues from agriculture decline and become highly unreliable. This is one of the reasons why Kyrgyz farmers have recently tended to invest more in livestock breeding, which in turn leads to overgrazing of pastures and thus to further soil degradation.

An expert from the Kyrgyz Institute for Irrigation explained that the above-described problems in water-land interaction have existed since the introduction of large irrigation systems in Soviet times. This legacy is the reason for the present alarming situation. It is for this reason that the following assessment of water-land interaction as regards IWRM goes beyond a mere investigation of the *status quo*, analyzing whether water managers are taking initiatives to prevent waterlogging, salinization, and erosion.

3.3.1 Waterlogging and salinization

All actors involved in Kyrgyz water management perceive waterlogging as the most pressing ecological problem. According to an expert from International Water Management Institute (IWMI) Tashkent, on average about 15 % of the arable land in the Ferghana Valley is waterlogged.[1]

The most important causes of waterlogging are inadequate irrigation and drainage practices. In Kyrgyzstan, surface irrigation by controlled flooding or furrow irrigation is the most common watering practice. It involves excessive water consumption compared with more efficient irrigation practices. In addition, surface irrigation encourages topsoil erosion and nutrient leaching, both of which result in reduced soil fertility. During Soviet times, sprinkler irrigation was a common technique, but nowadays, only a very small portion of irrigated land is equipped with this technique. This is due to the fact that the sprinkler systems were adapted to the large

1 Waterlogging occurs when the groundwater level rises, and this has negative impacts on plant growth and yields. Only complicated rehabilitation work can reverse the process of waterlogging, especially when reeds have started to grow on the surfaces affected. Waterlogging moreover contributes to the contamination of wells and corrosion of building foundations.

farm structure introduced in Soviet times. They are unsuited for the small, fragmented land plots which have developed since the land reform. Waterlogging is often exacerbated by water losses, which are due to the bad state of the existing irrigation infrastructure (damaged canals, earthen canals).

The practice of flooding fields implicitly requires adequate drainage to conserve soil quality and avoid waterlogging and salinization. Drainage is especially indispensable in arid climates such as in Central Asia, where high evaporation promotes the accumulation of minerals and salts in topsoils. The Food and Agriculture Organization (FAO) estimates for Kyrgyzstan that more than two thirds of irrigated areas are in need of drainage. In practice, however, only a small portion, about 14 %, of irrigated land is equipped with appropriate drainage facilities. The most common practice is surface drainage through ditches and trenches. Subsurface drainage also exists, but it is less frequent and often broken down since it involves more complex structures and higher costs (FAO AQUASTAT 1997).

The final result of waterlogging may be salinization. Kyrgyz soils generally feature high contents of mineral salts. These are mobilized by irrigation water and transported to the topsoil through evaporation, especially when groundwater levels are high. Frequently, the water used for irrigation is already saline, and this leads to further accumulation of salt in the soils. The consequence for agriculture is crop damage and reduced yields. In extreme cases, agricultural production becomes impossible, a situation which, fortunately, is by far less worrying here than in Uzbekistan or Turkmenistan. In Kyrgyzstan, 13 % of soils are affected by salinization, compared to 50 % and 96 % in Uzbekistan and Turkmenistan, respectively (Bucknall et al. 2003, 9). One remedy for salinization is the practice of leaching the affected soils by applying large volumes of water. Leaching is not always successful, depending again on the salt content of the water, and it furthermore leads to an excessive increase in water consumption.

Initiatives to reduce overwatering

One useful countermeasure to prevent waterlogging and salinization is to reduce water use in agriculture. This presupposes availability of detailed information of water needs of soils and crops. Yet almost everywhere in Kyrgyzstan, farmers and water managers continue to use standards dating

from early Soviet times, even though during the past 50 years, the situation of soils and especially groundwater has changed. The Soviet norms were developed for the state and collective farm structure with fields of over 500 ha. Different norms are needed for the current farming structure, with its small land plots.

In one of the WUAs investigated – it is located in the south of Kyrgyzstan – a new system of irrigation standards is being developed. 'Farm passports' have been introduced, containing data about water and fertilizer needs of specific soils. This optimization has led to an increase in yields by more that 20 %. Additionally, an effective means of erosion prevention has been devised. Furthermore, farmers are advised by water managers on how much water they should use. These practices led to a reduction of water use by 37.5 % between 2002 and 2004 (Masumov 2005, 7). The WUA described has received special support as a pilot WUA of the Ferghana IWRM Project, and it can therefore not be regarded as a typical example of Kyrgyz WUAs. A more 'realistic' situation was found in a WUA in Batken *Oblast* whose managers and staff are aware that different watering norms should be used for different soil types. Here, the development of new standards failed for lack of financial means and know-how.

The main constraint regarding the gathering of information that might help to prevent waterlogging and salinization is, according to specialists from the Agrarian University, the fact that the necessary data are very comprehensive and thus difficult and expensive to collect. In spite of these difficulties, Kyrgyz research institutes, such as the Institute of Irrigation or the Institute of Water Problems (both situated in Bishkek), have started to develop databases and maps containing most of the needed data. Unfortunately, the will and/or the financial means to make use of these data does not exist, either in governmental water management organizations or in NGOs or WUAs. As a consequence, the institutes themselves are now suffering from financial constraints, which are a threat to the continuation of their research.

Another promising approach to reducing water losses and thus also the problems linked to water-land interaction is canal rehabilitation, which is financed by several donor programs. These programs give credits only to WUAs that are quite 'advanced' according to donor criteria because of

their assumed higher creditworthiness.[2] In regions where WUAs have only recently been created and donor credits are therefore not available, canal rehabilitation often fails because of lack of financial means. Furthermore, there were reports of cases where agreement was reached with WUAs that only parts of canals would be rehabilitated, because this reduced borrowing requirements, and thus also repayment rates. This approach of course conforms neither to IWRM principles nor to the former engineering approach to water management (cf. Box 1).

The existing drainage systems were constructed during Soviet times to meet the needs of huge state and collective farms. They are not adapted to the fragmented peasant farm structure that has developed since independence. On average, drains are in even worse condition than supply canals. Many of them are not sufficiently deep or are congested by sediments or reeds (Bucknall et al. 2003, 5 f.). An increasing length of canals is reported to be no longer operational at all (UNECE 2000, 76). Nevertheless, in some WUAs the importance of drainage systems has already been recognized. But unfortunately, in many cases the rehabilitation of drainage infrastructure fails for lack of financial means, a situation which is supposed to be alleviated by the donor-financed rehabilitation projects.

High speed of the land reform process

Another factor contributing to aggravating the problem of waterlogging and salinization in Kyrgyzstan was the high speed of the land reform process. In the great rush no one thought of involving hydro-technicians in the process. This has led to a difficult situation for water managers, since the land plots next to the canals, which were to serve as repair banks, have been distributed to farmers in the course of the land reform process. Today, the land concerned is cultivated, and the canals are no longer accessible for maintenance work.

2 The World Bank has identified seven milestones to assess the functioning of WUAs. They comprise (1) the WUA establishment, including legal registration and bank account, (2) recruitment of WUA staff, (3) preparation and approval of an operation and maintenance (O&M) plan, (4) payment of O&M costs and ISF, (5) identification of alternatives for rehabilitation, (6) selection of an alternative for rehabilitation, and (7) majority vote for rehabilitation measures and application for a credit (Johnson III / Stoutjesdijik / Djailobayev 2002).

In the same context, another problem arises from the fact that the irrigation and drainage infrastructure has only recently been transferred to the ownership of WUAs. This led to a feeling of non-responsibility during the time prior to transfer, often resulting in the destruction of the drainage systems. Instead, people often preferred using the land to cultivate crops. When irrigation and drainage systems were finally transferred to the ownership of WUAs, they in some cases refused to accept them. The main reasons are first the high maintenance costs and second the fact that WUAs are sometimes not aware of the need for drainage systems.

Lack of know-how

According to most of the interviewees, local irrigation management suffers from a serious lack of know-how regarding irrigation techniques and water needs of soils and crops. Many farmers appear to tolerate the progressive salinization and waterlogging of their plots, as they tend to overirrigate and do not maintain or rehabilitate adequate drainage facilities. Possible explanations include lack of knowledge about water-land interaction, and economic constraints. The problem is aggravated by the fact that even WUA managers and *mirabs* are not always specialists in their field and thus not always able to fulfill their duty in providing farmers with information and advice on irrigation techniques and water needs.

Several interviewees stated that in the south of Kyrgyzstan agricultural expertise is far better founded than in the north. The reasons for this are land scarcity and the resulting need to cultivate in more intensive ways as well as a longer tradition of agriculture in the south. Also, the farmers in the south seem to be more interested in training programs, as stated by an expert from an NGO in Osh: *"In general, farmers in the south have attended more training than northern farmers. […] People are interested in water-saving technologies even, if they do in general not have problems or little problems with water scarcity."*

These different levels of knowledge in north and south Kyrgyzstan are confirmed by answers given by farmers regarding irrigation techniques: In Osh and Batken *Oblasts*, the information was much more detailed and proved to be better rooted in knowledge than the information given by farmers in Chui *Oblast*.

Training measures

Knowledge deficits are addressed in the trainings provided to WUAs. However, rehabilitation measures concentrate mainly on water supply infrastructure, and ecological questions play only a minor role in WUA trainings. This weakness has been recognized by the World Bank, which has started to develop training materials for WSUs concerning environmental questions. Trainings designed to increase farmer's knowledge of water-land interaction were mentioned only in some rare cases, and such information seems at present to be provided only by a few NGOs. In this context, one representative from an NGO mentioned a high level of motivation of farmers during the off-season, a potential that could help to overcome the knowledge gap.

Possible improvements / Recommendations

— Recommendation to the Kyrgyz government: **Increase farmers' interest in maintaining the long-term productivity of their land.**

  Efforts to develop a land market should be stepped up, as this motivates farmers to invest in the fertility of their soils, even if they do not intend to cultivate their land themselves in the long run. Additionally, it is necessary for the Kyrgyz government to support the *ayil okmotus* in providing farmers occupying canal repair banks with equivalent replacement land plots.

— Recommendation to WSUs and donors: **Provide training for farmers and water managers about water-land interaction and irrigation techniques**.

  Considering the serious lack of know-how, training for farmers and water managers about environmental issues and irrigation techniques is absolutely necessary. The sustainability of agriculture can only be ensured if proper heed is paid to water-land interaction. The most appropriate approach seems to be training for trainers. In Osh *Oblast*, NGOs like RDC-Elet have started trainings for WUAs concerning sustainable land use and prevention of erosion, waterlogging and salinization. They should be further encouraged, i. e. by integrating their activities into existing donor programs.

— Recommendation to WUAs: **Increase water fees for water users, and require them to participate more in terms of labor.**

Lack of financial means at all levels of the water management hierarchy is the most pressing constraint impeding the rehabilitation of the irrigation infrastructure. Since the government as well as the WUAs are highly indebted, the only way to overcome the financial constraints that are obstructing canal and drainage rehabilitation is greater participation of water users in terms of labor and cash. The fact that water fees are too low even aggravates the problem of over-irrigation, because it induces people to use too much water. Raising water fees might thus have the positive side effect of reducing water use.

3.3.2 Soil erosion

In mountainous countries like the Kyrgyz Republic, steep terrain encourages soil erosion caused by the rapid flow of (irrigation) water. Livestock breeding, especially in the mountainous regions, has contributed to the degradation of grasslands as well as to deforestation. In the areas under consideration here, the slope land in the upstream zones is used as pastures. According to an expert from CAMP, 70–80 % of the pastures in Kyrgyzstan are affected by soil degradation, due to overgrazing. In most of the villages under consideration, the hilly upstream areas and lower mountainous zones are clear of bushes and trees. On these bleak slopes, landslides pose a considerable risk. In recent years, this most dangerous form of erosion occurred both in the north and in the south of Kyrgyzstan, claiming human lives, destroying the livelihoods of entire villages and threatening industrial sites. Tailings of uranium mines in particular can turn into serious threats to human health and the ecosystem, if nearby rivers are blocked by mudslides, leading to flooding of radioactive waste.[3]

According to several interviewees, erosion and overgrazing already occurred during Soviet times. Although livestock numbers have decreased since 1991, on average the status of the pastures situated in the surroundings of human settlements has not improved. This is due to the fact that farmers tend to concentrate livestock around the villages, a practice that seriously overstrains the land's carrying capacity. Only rich farmers can

3 This nearly happened when, on 13 April 2005, a landslide carrying 300,000 m^3 of mud came down near Mailuu-Suu in Jalal Abad *Oblast* and almost damaged a nearby uranium tailing (Khamidov 2005, 2).

afford to transfer their livestock to pastures higher in the mountains, where the livestock density is lower. According to the national environment report,

> *"(...) at present, due to sharp reduction of cattle on distant and remote pastures, the process of natural rehabilitation has begun. However, on pastures located close to residential settlements the process of degradation is going on"* (Kyrgyz Republic/Ministry of National Environment Protection 2000).

Furthermore, erosion by irrigation water leads to a loss of fertile topsoil and therefore has a negative impact on plant growth and productivity. Additionally, it impairs soil stability, which leads to further and deeper erosion. Although the irrigated land in Kyrgyzstan is located almost entirely in relatively flat areas of valleys and basins, the prevailing practices of surface irrigation are stimulating topsoil erosion.

Erosion brings with it increased sediment loads in rivers, which constitutes a severe problem for irrigation infrastructure in downstream areas. Some farmers complain that irrigation water does not reach their fields because sediments block the canals. Besides this, removal of the soil cover of fields dissolves salts, fertilizers, and other agrochemicals contained in it. Via the drainage systems they are transported back to the rivers. This adds to the above-described problems concerning water quality (cf. 3.2.1).

Lack of problem awareness

The 'Agrarian Policy Concept of the Kyrgyz Republic to 2010' makes soil erosion a subject of discussion:

> *"The most actual problem is land degradation. At present about 100 thousand ha of land are outside of agricultural activity. Extraction of nutritive components from the soil exceeds by four times their application along with fertilizers. Reclamation systems are declining, areas of soil corrosion are increasing"* (Kyrgyz Republic 2004a, 12).

But, unfortunately, the new Water Code lacks a clear statement concerning promotion of measures to prevent erosion. This gives a first hint as to the existing lack of problem awareness regarding the interaction between water and land use. This assumption is reinforced by the fact that the governmental officials interviewed only rarely mentioned water-land interaction. A clear statement underlining this impression was made by an expert

from IWMI Tashkent: "*The loss of soil and the deepening erosion is not perceived as a problem by the authorities even though the soil is their major productive resource.*" As a consequence, neither reforestation measures nor initiatives to decrease livestock density were encountered in the surroundings of the villages covered by the present study.

At local level, due to a lack of training and education campaigns, both WUAs and farmers are not aware of the causes and consequences of soil erosion. Again, in the north of Kyrgyzstan, farmers are less aware of the problems related to water-land interaction than in the south of the country, an observation that tallies with the different levels of knowledge on farming issues already referred to.

Possible improvements / Recommendations

— Recommendation to the MAWMPI, MEES, and *ayil okmotus*: **Reduce the number of livestock or intensify livestock breeding and take reforestation measures.**

  For the hilly upstream zone, it is strongly recommended to reduce the number of livestock, and to launch a program of reforestation. The *ayil okmotus* should think about introducing fees for the use of pastures around the villages, in order to encourage farmers to use the pastures in the mountains, which are still intact. Another solution would be an intensification of livestock breeding. First signs of a change of farmer preferences towards fodder crop production have already been noted.

— Recommendation to WSU / WUAs / NGOs: **Launch awareness raising campaigns.**

  In order to raise the problem awareness of water users, it would be important to launch measures such as sensitization campaigns through local radio or flyers. Water-land interaction could be integrated into school and university curricula. Additionally, all training programs for Kyrgyz water managers should be enlarged to include an awareness-raising component.

4 Sectoral integration

The aim of this chapter is to analyze Kyrgyz water management with regard to sectoral integration, the second pillar of the IWRM Pyramid. Sectoral integration is the objective of IWRM, maximization of societal benefit through internalization of existing externalities. These may occur as ecological externalities (e. g. in the form of unsustainable water use patterns, cf. 4.1), as economic externalities (e. g. unjustified subsidies, cf. 4.2), and as social externalities (e. g. neglect of the poverty and health impacts of water management, cf. 4.3).

4.1 … of ecological externalities

In order to bring water management into line with IWRM, water managers need to take into account eco-systemic interdependencies such as upstream-downstream linkages, both water quantity and water quality, and interactions between water and land resources. The preceding chapter has analyzed the extent to which this 'ecological integration' has already been realized in Kyrgyz water management. Yet the answer to this question tells us nothing about the *objectives* of Kyrgyz water management, since ecological integration, as defined above, could also be justified by purely economic considerations – safeguarding soil productivity, for instance. However, IWRM demands that the entire set of societal preferences be integrated into water management. Besides economic and social progress, societal preferences could e. g. also include safeguarding nature as an objective of its own. Good water governance should make inclusion of this objective possible by ensuring that 'ecological externalities' of human water use are taken into account. In line with this reasoning, the degree to which Kyrgyz water management integrates ecological externalities will be analyzed.

4.1.1 Legal responses to environmental problems

The challenges raised by nature conservation and the global environmental discourse have led to the incorporation of environmental provisions into Kyrgyzstan's new water legislation. However, analyzed in detail, enforcement regulation turns out to be weak, and provisions for environ-

mental protection are driven more by an economic rationale than by a concern for nature itself.

Conservation of nature is enshrined as a prime objective in the new Water Code. Article 1 states:

> *"This Code shall regulate water relations in the area of use,* protection *and development of water resources for guaranteed, adequate and safe supply of water to the citizens of the Kyrgyz Republic, for the* protection of the environment *and the promotion of the rational development of the country's water fund"* (emphasis by the authors).

Reflecting the importance of this objective, about a fourth of the Code's 99 articles explicitly address environmental concerns. Most interestingly, Article 64 contains a minimum ecological flow requirement, a key demand of environmentalists regarding basin management. Other articles deal with the MEES's competencies in Kyrgyz water management (Art. 12), pollution permits (Art. 49f.), and the creation of different types of water protection areas (Art. 65f.).

However, the legislative framework for translating these ecological provisions into practice is in some ways underdeveloped:

> *"The Kyrgyz legislation in the area of protection and rational use of water resources envisages low amounts of fines and suits for violation of the established norms, as well as payment for discharge of pollutants into water objects, which does not compensate for the real costs of the organization [of] sewage water cleaning measures, and does not stimulate water users to change their attitude or introduce clean technologies"* (Development Gateway 2005).

It will prove to be a challenge to realize the stated objectives of nature conservation with the aid of legal provisions for enforcement that pre-date the new Water Code. As these regulations are more concrete and thus more relevant for everyday water management, they may prevail in practice over the more programmatic Code.

In addition, the new Water Code's environmental provisions appear not always to be driven by a genuine interest in nature conservation. Instead, economic and public health concerns seem to be the driving forces. For instance, the "*health of fish stocks*" (Kyrgyz Republic 2005, Art. 64) is the

first rationale to be named for the ecological flow requirement.[4] Furthermore, the preliminary list of water use priorities to be respected by the future Basin Water Plans completely omits nature as a legitimate water user (Art. 24). Despite the thrust of the declaration in Article 1 of the new Water Code, environmental protection thus appears to seen rather as an instrumental means for advancing economic or social aims.

Possible improvements / Recommendations

To improve the water-related legislative and regulatory provisions for the conservation of nature, the following initiatives could be taken:

— Recommendation to the Kyrgyz Parliament (*Jogorku Kenesh*): **Amend the new Water Code in order to grant nature conservation even higher priority.**

  Although environmental concerns feature prominently in several rather general articles of the new Water Code, they are not adequately reflected in its more detailed provisions. More emphasis on environmental concerns should be used to make it clear that nature conservation is a value as such.

— Recommendation to the Kyrgyz government and the Kyrgyz Parliament: **Improve enforcement mechanisms for environmental protection.**

  The spirit of the new Water Code will be difficult to translate into reality as long as mechanisms for enforcing environmental provisions remain basically toothless. Regulations on fines and accountability as well as practical monitoring and control thus need to be strengthened.

4.1.2 Nature conservation in practice

The instrumental approach towards environmental protection is also reflected in practical decisions of water managers. For instance, the Issyk Kul regional development plan – regarded as exemplary by the water administration – embraces environmental concerns solely in order to safeguard the region's potential as an important tourist destination. Whether the environment would matter in the absence of a sizable economic moti-

4 For a critical comment on this issue, cf. Siganshina (2005, 6).

vation is rather questionable. Corresponding to this order of priorities, water managers no longer ensure minimum ecological flows in natural water courses as soon as it becomes technically feasible to abstract more water for agriculture. Sometimes, 100 % of the available water flow is used for irrigation purposes, causing whole rivers to run dry.

Integration of environmental externalities into water management is further complicated by organizational insufficiencies, as already observed in relation to water quality aspects (cf. 3.2.1). In general, the gap between legal provisions and the reality on the ground is considerable, since organizational monitoring and enforcement capacities are lacking. Severe lack of funds has led to a worrying decay of water quality monitoring, a large proportion of measurement stations being out of use now. The new Water Code, however, foresees the creation of a State Water Cadastre containing information on water quality and quantity of surface and underground waters (Art. 94) as well as a State Ameliorative Cadastre with information on soil degradation (Art. 95). As far as enforcement is concerned, the new Water Code puts particular emphasis on water inspection (Art. 88f.). But it remains to be seen whether and to what extent the newly created water inspections will be able to fulfill their role (Amankanov / Bekturova 2005).

In addition, responsibilities for water-related ecological questions are marked by overlaps, the MEES, the Ministry of Health, the Ministry of Geology, *Gidromet,* and the DWM being the main institutions concerned. Initiatives conceived to pull together the corresponding responsibilities under the new State Water Administration have failed, and it remains to be seen whether the new coordinating bodies (the National and Basin Water Councils) will succeed in overcoming departmental egoisms. Furthermore, most ministries seem to focus on micro-management, i. e. to lack a strategic perspective. Their missions thus run the risk of being lost sight of, and everyday decisions are disconnected from agreed-upon national policy, which appears to be more favorable towards the conservation of nature.

Lack of pressure from donors does not contribute to changing this situation: Although the international lending institutions engaged in the Kyrgyz water sector do not completely neglect ecological questions, they do not put particular emphasis on nature conservation either. Donor definitions of sustainability are biased towards economic sustainability. According to an employee of the MEES, "*ecological problems figure only in the last place*

in their list of priorities." Like the Kyrgyz administration, donors appear to lack a strategic vision, focusing instead on the practical implementation of their projects. However, it should be obvious that recovery of irrigated agriculture, assisted by donor-financed rehabilitation measures, will have decisive impacts on the environment both in Kyrgyzstan and downstream countries.[5]

The general order of priorities in Kyrgyz water management – denying nature the status of a legitimate water user – is understandable in view of the economic hardship presently endured by Kyrgyzstan's population. The current approach may reflect society's actual preferences: Ecology is still secondary in public discourse, although ecology classes have been introduced at university, and donors have initiated awareness-raising campaigns covering water-related ecological aspects (notably with the well-known slogan 'Water is life').

However, the neglect of ecological concerns contradicts the principle of sustainable development, since today's (in)action could irrevocably damage Kyrgyzstan's ecosystem. Thus future Kyrgyz generations – possibly placing more value on nature – may no longer be able to satisfy their specific preferences.

Possible improvements / Recommendations

In consideration of the preceding assessment, the following actions could be undertaken in order to better integrate ecological externalities into Kyrgyz water management:

— Recommendation to the Kyrgyz government: **Enable the MEES to strategically mainstream environmental protection throughout Kyrgyz water policy.**

  Since responsibility for water-related environmental issues will not be transferred completely to the new State Water Administration, all further ecological competencies regarding water management should be concentrated within the MEES. This would help overcome the

5 Most rehabilitation projects aim at water saving, which induces positive environmental effects if the water saved is used to augment the natural flow of rivers. However, this water can also be used to open up new agricultural lands. Moreover, a dynamic recovery of Kyrgyz agriculture will cause the use of agro-chemicals to increase again, and it is thus a threat to water quality.

parallel structure which currently hampers the up-scaling of environmental concerns in Kyrgyz water management. The ministry should also be strengthened and focused on strategic policy formulation to enable it to assure that due attention is given to environmental concerns by the National and Basin Water Councils as well as by the new State Water Administration.

— Recommendation to the Kyrgyz government: **Increase the influence of economic actors with a particular interest in a healthy ecosystem – such as the tourist industry – in policy-making bodies.**

  As long as Kyrgyz society does not consider the conservation of nature as an objective of its own, sustained interest in protecting the environment can nevertheless be articulated by economic actors that heavily rely on a beautiful landscape, clean water, etc. The tourist sector could be a key actor in this regard. Thus care should be taken to ensure that tourism is sufficiently represented in the governing bodies to be set up under the new Water Code, in particular in the National and Basin Water Councils.

— Recommendation to donors: **Grant higher priority to ecological considerations in irrigation rehabilitation projects and political conditionality.**

  As international donors finance most of the rehabilitation work undertaken in Kyrgyzstan, their influence on Kyrgyz water management cannot be overestimated. Due to the dependence of the Kyrgyz government on international funds, donor leverage on national policy formulation is also considerable. Donors should use this factual influence in a responsible manner, trying to convince and enable the Kyrgyz authorities to give more consideration to ecological externalities in water management.

4.2 … of economic externalities

This section deals with the question of whether and to what extent Kyrgyz water management contributes to or contravenes economic efficiency. Both water allocation between irrigation and other economic uses and the cost structure of irrigation service provision will be scrutinized.

4.2.1 Inclusive water allocation

Economic water use

In Kyrgyzstan total water consumption amounts to about 9 km³/year, approximately 2 km³/year less than the country is entitled to consume according to regional agreements (UNECE 2000, 74).[6] This total amount is shared very unequally between different economic sectors. The latest data from the Kyrgyz National Statistical Committee indicate that agriculture accounts for 95 % of total water consumption, whereas industrial and domestic water uses claim only 3 % and 2 %, respectively (Kyrgyz Republic/National Statistical Committee 2004b, 16–17). Domestic water consumption seems to have risen in recent years, by about 25 %, especially in the capital Bishkek and other urban centers (UNECE 2000, 74 f.). The countrywide rehabilitation projects on rural water supply infrastructure, financed by the World Bank and the Asian Development Bank (ADB), contribute to increasing access to drinking water outside the cities. Industrial water consumption declined by almost 80 % between 1991 and 1998, reflecting the general deindustrialization process in Kyrgyzstan. It can, however, be assumed that industrial water consumption will increase again in the years to come as a result of economic recovery.

It should be noted that the numbers cited on water consumption do not include water use for hydropower generation, as the latter is non-consumptive. Energy generation has become a key concern in Kyrgyz water management since external supply with gas and coal grew expensive and barter agreements with downstream countries (water for coal and gas) became unreliable following independence. With its storage capacity of 19.5 km^3, the Toktogul reservoir on the Naryn River provides the lion's share (97 %, according to Antipova et al. 2002, 506) of Kyrgyz hydropower. While this and other Kyrgyz reservoirs were constructed primarily to serve agriculture in downstream countries, their flow regime has pro-

6 For 2003, the Kyrgyz National Statistical Committee records total water consumption of 7.55 km³ (Kyrgyz Republic/National Statistical Committee 2004b, 15). All these numbers are highly unreliable, however, as measurement is wholly inadequate.

gressively been turned towards the satisfaction of domestic energy demand since the dismantling of the Soviet Union.[7]

Allocation mechanisms and problems

As mentioned above, power generation has become a major concern for water management in Kyrgyzstan. As regards absolute distribution, there is no competition between hydropower generation and other water uses, since the former is not water-consuming. However, competition over relative distribution – seasonal distribution of water flow – is a key issue in Central Asia. Irrigation requires that reservoirs release water during the crop-growing season, i. e. in summer, whereas electricity demand peaks in winter, i. e. in the non-cropping season. While this conflict dominates 'hydropolitics' between Kyrgyzstan and its downstream neighbors, in the Kyrgyz Republic priority is clearly given to power generation. Responsibility for the regulation of the Naryn River, the source of most of Kyrgyzstan's hydropower, is with the Ministry of Energy. In addition, the hydropower-producing companies, legally private entities but in public ownership, directly address their requests for additional water releases to the country's first vice prime minister. This priority granted to electricity production in the management of the big reservoirs results from the fact that energy is more politicized than irrigation in Kyrgyzstan. In addition, the negative consequences on agriculture barely affect Kyrgyz farmers, since absolute water scarcity in summer (and winter flooding) mostly occur in downstream countries.

Industrial users need to address the DWM or its decentralized branches, the *OblVodKhozes* and *RayVodKhozes*, for water allocation if they do not have wells of their own. The DWM, however, is exclusively focused on irrigation. This is underlined by the fact that the *OblVodKhozes* and *RayVodKhozes* comprise own melioration units, which are responsible for monitoring the quality of cultivated soils. They also host the WSUs, which deal exclusively with improving agricultural water management. However,

7 Following independence, the Toktogul reservoir's releases for power generation in non-vegetation periods rose from 2.8 km^3 to 8.5 km^3 (Antipova et al. 2002, 507). The increased winter releases from Kyrgyz reservoirs cause severe flooding problems in downstream Uzbekistan and Kazakhstan. These problems were discussed intensively in spring 2005 (cf. The Times of Central Asia 2005a and 2005b). For a general discussion of the region's water conflicts, cf. ICG (2002).

competition between agricultural and industrial water uses seems to play only a minor role in Kyrgyzstan, as industrial water consumption has fallen to negligible amounts.

Provision of households with drinking water is separate from this system, since drinking water is (or ought to be) taken from different sources, mainly from groundwater. The former central organ responsible for managing rural drinking water supply, the *Kyrgyz Ayil Suu* (KAS), has been dissolved and replaced by the Department of Rural Water Supply, which focuses on policy-making. Responsibility for the management of individual drinking water systems has been transferred to Drinking Water Unions (DWUs), which are patterned on the model of WUAs. Urban drinking water is supplied by municipal service providers, legally private companies but for the most part owned by the state.

Despite the usual separation of drinking and irrigation water systems and the negligible amounts of water consumed by households compared to agriculture[8], conflicts between both sectors do occur locally. The existing rural drinking water systems were set up during the 1970s and 1980s for drinking and firefighting purposes. However, due to the deterioration of irrigation infrastructure after independence, farmers in some places started abstracting drinking water for irrigation purposes. Current drinking water supply rehabilitation projects thus face fierce resistance from farmers when the DWUs attempt to take back boreholes or pipes. Since rehabilitation, water theft for agricultural use has occurred occasionally, threatening the sustainability of drinking water schemes.

These problems result from lack of enforcement of property rights and of coordination of donor projects in drinking water supply and irrigation water supply. As rehabilitation measures are not undertaken simultaneously, there is competition between the two uses. In addition, administrative responsibilities for the management of drinking water and irrigation water are strictly separate, as described above. While this is unproblematic in most cases thanks to the different water sources and separate supply

8 The Department of Rural Water Supply assumes a water consumption of 50 liters per capita per day. Consequently, a household composed of five members consumes 91,250 liters or 91.25 m^3 of water per year, whereas one hectare of wheat consumes 5,000 m^3 on average per cropping season.

systems, a more integrated approach to water management could be advisable wherever linkages between both sectors seem appropriate.[9]

Changes induced by the new Water Code

The new Water Code takes up the challenge of insufficient institutional integration of different water use sectors. Although a completely integrated structure of water management with all relevant actors and ministries assembled in one body has been vetoed by the line ministries concerned, the new National Water Council (Art. 9) aims at improving efficiency and transparency of water allocation between different uses. The creation of the new State Water Administration (Art. 11), which is supposed to replace the DWM, pursues the same objective. The State Water Administration will be independent of the Ministry of Agriculture, to which the DWM is currently subordinate, a fact which partly explains its focus on irrigation water use. Thus more attention might be given to water uses, like tourism, that are at present currently largely neglected. Similar inter-sectoral management structures will be created at basin level, with the Basin Water Councils (Art. 10). They already exist, on a smaller scale, in the IWRM Ferghana Project's pilot canals, where Canal Water Management Units (*upravleniye kanala*) and Canal Water Committees (*vodokomitet kanala*) have been set up.

However, first experience shows that these new structures still tend to be dominated by the old, irrigation-focused water administration from the *OblVodKhozes* and *RayVodKhozes*. A water management specialist with the IWRM Ferghana Project complained that

> *"the Canal Water Management Unit does not feel responsible for water supply to other sectors. They care only for irrigated agriculture. In reality, the water is also used for many other purposes such as drinking water, for animals etc., and the water managers don't keep that in mind."*

9 Similar problems of lacking inter-sectoral integration can be observed vis-à-vis fishing and agriculture, although only anecdotal evidence is available. For instance, people using reservoirs for fish farming sometimes release water in order to facilitate their fish harvest. This can cause waterlogging on agricultural land downstream.

Possible improvements / Recommendations

Bearing the above assessment in mind, action should be taken to improve the integration and coordination of all water-using economic activities in Kyrgyz water management:

— Recommendation to the Kyrgyz government: **Create and empower the new inter-sectoral management bodies provided for in the new Water Code as soon as possible.**

  The management structure laid down in the new Water Code (Art. 9f.) is a promising instrument to achieve better integration of all water-using economic activities. However, care has to be taken that the implementation of these provisions is not delayed by the recent political turmoil. It should also be ensured that the National and Basin Water Councils' roles are not limited to merely consultative functions. As there is a certain risk that the new State Water Administration may take over the agricultural bias from the DWM, special efforts should be addressed at ensuring that all forms of water use are equally represented.

— Recommendation to the *ayil okmotus*: **Take steps to ensure appropriate communication and coordination between WUAs and DWUs.**

  Although the *ayil okmotus* do not have formal authority over WUAs or DWUs, they do hold a key position for all questions of local development. Although, in general, it will not be appropriate to merge WUAs and DWUs into one structure, a high level of communication and coordination between the two is needed in order to avoid problems such as theft of drinking water for irrigation purposes or pollution of drinking water by drainage water. The *ayil okmotus* could provide appropriate forums for coordinating irrigation and drinking water supply, even though service areas of WUAs and DWUs frequently do not exactly match *ayil okmotu* boundaries.

4.2.2 Financial sustainability

Underfunding of irrigation services

A general shortage of funds is one of the sector's key problems, one that decreases the economic benefits of irrigated agriculture. Deterioration of irrigation infrastructure in particular results from a severe lack of resources

for maintenance and rehabilitation, severely affecting the productivity of irrigated agriculture: Irrigation water is distributed through a complex system of reservoirs, diversion works, canals, pumping stations, and water control structures, which decayed rapidly following independence. Almost all Kyrgyz reservoirs face serious problems of sedimentation, leading to a reduction of their storage capacity (UNECE 2000, 72 f.). As regards the distribution network, the lower hierarchies within the system have suffered the most serious deterioration. An increasing length of canals is reported no longer to be operational at all (UNECE 2000, 76).[10] In addition, most of the secondary and tertiary canals are earthen and not lined with concrete, a circumstance that serves to further increase water losses (Koshmatov 2004, 22). A report by the International Water Management Institute (IWMI) estimates that the total losses of primary and secondary canals range between 26–45 %, while the subsequent losses at the tertiary level can account for up to 50 % of the remaining water (Ul Hassan / Starkloff / Nizamedinkhodjaeva 2004, 39). This leads to serious water shortages, especially in the tail sections of the system.

Due to the post-independence economic crisis and the drying up of Soviet-era transfers to Kyrgyzstan, the government has not been able to maintain the former levels of funding. Due to pressing problems in other sectors and socially oriented spending priorities (IMF 2005a, 13), less than 2 % of the national budget is currently spent on irrigation. These funds are clearly insufficient to manage and maintain the irrigation system: Budget allocations cover only about a third of expenses (World Bank 2004a, 43). According to an expert at the IWRM Ferghana Project, "*with state money it is not working. Everything is postponed every day.*" The government's financial constraints are also decreasing the reliability of budget transfers to the DWM's local branches. One *RayVodKhoz* employee complained: "*The problem with the Government money is that it fluctuates and could end anytime.*" State funding appears to be erratic, provided only in response to the most urgent needs: "*Governmental money comes only in emergency situations such as flooding etc.*", according to the expert quoted above. This complicates decentralized budgeting and makes long-term planning for infrastructure development by *OblVodKhozes* and *RayVodKhozes* impossible. It can further lead to forced inactivity of *OblVodKhoz* and

10 Since independence, the total capacity of primary and secondary canals has decreased by 25 % (Koshmatov 2004, 23).

RayVodKhoz staff when even basic inputs required for their work (such as electricity, paper, or gasoline) are not available.

However, this does not mean that the limited amount of public funds available for irrigation could not be used more efficiently. In 2004 the DWM spent 242 million som (€ 4.6 million). Of this, only about 3.5 million som (€ 67,000) were allocated to the central apparatus in Bishkek, all the rest going to the *OblVodKhozes* and *RayVodKhozes* (data provided by the Ministry of Finance). Except for the resources allocated to the *oblast* and *rayon* WSUs, which establish and support WUAs, the funds for *OblVodKhozes* and *RayVodKhozes* are used to pay the administrative staff responsible for water allocation and fee collection as well as for the salaries of line staff employed for maintaining and operating the infrastructure under *oblast* and *rayon* responsibility. It appears that these funds are not spent very efficiently, as they are used either for administrative tasks that appear in part redundant and could relatively easily be handed over to water users' organizations, or for technical tasks that could be performed better and more cheaply by private sector companies. At the same time, the DWM itself lacks resources, staff, and thus policy-formulation capacity.

International donors, most prominently the World Bank and the ADB, are attempting to alleviate this problem of underfunding by providing considerable means for irrigation rehabilitation (cf. Box 11). The World Bank Irrigation Rehabilitation Project (IRP, US $ 42 million) aims at rehabilitating the primary and secondary infrastructure. It is currently being phased out. The more recent On-farm Irrigation Project (OIP, US $ 26 million) targets on-farm infrastructure. Together with the Asian Development Bank's Agriculture Area Development Project (AADP, US $ 36 million), it is expected to be completed in 2007. In spite of the considerable amount of funds the two institutions have already invested in Kyrgyz irrigation, their rehabilitation projects have not been able to cover more than 20–30 % of irrigation infrastructure (World Bank 2004a, 42). The World Bank is currently preparing a new ('Water Management Improvement') project, supposed to be launched in 2006, in order to narrow the investment gap and to provide further institutional strengthening in line with the new management structure. However, it will by no means be sufficient to complete the rehabilitation of irrigation infrastructure. In any case, the Kyrgyz debt

Box 11: Selected donor-financed projects

World Bank

Irrigation Rehabilitation Project (IRP), 1998–2005, countrywide

The objective of the project is to increase the productivity of irrigated agriculture through improved water supply. It includes the following components:

- rehabilitation and/or completion of up to 12 irrigation dams,
- rehabilitation of sections of primary and secondary irrigation canals, in order to improve operational capabilities, and
- capacity-building for the DWM within the MAWMPI. In the framework of the IRP, irrigation infrastructure serving about 300,000 irrigated hectares has already been rehabilitated.

On-Farm Irrigation Project (OIP), 2000–2007, countrywide

The project aims to promote sustainable water distribution on irrigated land. Its components are as follows:

- support for the establishment, and training of WSUs at all administrative levels,
- strengthening of the 'Project Implementation Unit' established for the implementation of the IRP,
- support for the rehabilitation of on-farm irrigation systems managed by WUAs. Priority is given to farms within the area of irrigation systems, which have been/will be rehabilitated under the IRP.

WUAs are expected to repay 25 % of the on-farm irrigation infrastructure rehabilitation costs.

Asian Development Bank (ADB)

Agriculture Area Development Project (AADP), 1999–2007, Chui Oblast

The project aims to promote agricultural productivity, thereby increasing farmers' incomes. It is based on four pillars:

- farm development,
- drainage and irrigation, including rehabilitation of on- and off-farm infrastructure and the introduction of new irrigation techniques,
- development of private sector market and input supply services, and
- project management.

The project addresses the need for capacity building through the provision of training to farmers. It aims to enhance farmers' skills in the field of water and land management techniques, soil protection, and water management software. The project has also promoted the establishment of WUAs, which are expected to repay 25 % of the on-farm irrigation infrastructure rehabilitation costs.

Swiss Development Cooperation (SDC) / IWMI / ICWC

Integrated Water Resources Management in the Ferghana Valley, 2001–2005, transboundary

The main goal of the project is to improve rural population livelihoods by demonstrating on a pilot scale the advantages of IWRM. More specifically the project aims

- to establish a new institutional framework for water management through the involvement of all relevant stakeholders,
- to support the formation of WUAs,
- to build the capacity of water managers at all levels, including at the WUA level,
- to promote the introduction of a legal base, regulating the implementation of water management, and
- to introduce a measurement system, ensuring sustainable and equitable water supply.

A field office and an ICWC 'Training Center' in Osh (Kyrgyzstan) have been set up to provide support for the implementation of activities in pilot areas. In the framework of the project, three pilot WUAs (one in Uzbekistan, one in Tajikistan, and one in Kyrgyzstan); a 'Water User Federation' in Kyrgyzstan (managing the Aravan Akbura Canal); and 'Canal Committees' (managing both the South Ferghana and Gulya-Kandoz Canals) have been established.

Source: Various Internet sources

reduction strategy, adopted on the advice of the IMF in consideration of Kyrgyzstan's already critical debt burden, will not permit the government to raise any more loans (IMF 2005a, 16). It must also be kept in mind that a considerable amount (almost 45 %; data provided by the European Union's Food Security Program) of the DWM's budget is already financed via direct budget support from the European Union. While these transfers

are not supposed to end abruptly, they cannot be relied on indefinitely.[11] As a national program officer with the Swiss-financed Natural Resource Management Project stated, the crucial question is "*What happens if the donors go?*"

Water fees and continued subsidization

Considering the problem involved in the funding of irrigation services, the donors – together with the Kyrgyz Ministry of Finance – have exerted pressure for increased financial participation from water end users in order to ensure the long-term financial sustainability of irrigation management. In fact, the transfer of tertiary infrastructure to WUAs seems to have been motivated primarily by these financial considerations. The WUAs are supposed to cover their expenses for operating and maintaining the on-farm infrastructure themselves by levying service fees. However, these fees generally appear to be too low (about 1–3 tyiyn/m^3 of irrigation water), which does not permit payment of proper salaries to WUA employees or the purchase of needed equipment. For instance, WUA directors are frequently paid no more than 1.000 som (less than 20 euros) per month, *mirabs* much less. The latter also lack basic transport facilities (like bicycles) and other equipment (measurement or communication devices) they need to adequately execute their tasks.

Even before the transfer of tertiary infrastructure to WUAs, regulations attached to the 1994 Law on Water introduced a public irrigation service fee (ISF) for water provided by the *RayVodKhozes*. The ISF currently amounts to 3 tyiyn/m^3 during the crop-growing season (April–September) – with a reduced fee of 1 tyiyn in remote areas like Naryn or Batken *Oblast* – and 1 tyiyn/m^3 in the non-cropping season (October–March).[12] This money contributes to the *RayVodKhoz* budgets and is supposed to finance part of their operations and maintenance work. However, it is far from sufficient to cover the corresponding costs. As an example, a *Ray*

11 In parallel to the increase in outstanding debt, new disbursements have already shown a marked downward tendency since 1999 (IMF 2005b, 26).

12 On national average, total irrigation fees (WUA service fee + ISF) rose from 0.95 tyiyn/m^3 in 2000 to 2.73 tyiyn/m^3 in 2001, 2.82 tyiyn/m^3 in 2002, 3.28 tyiyn/m^3 in 2003 and 3.81 tyiyn/m^3 in 2004 (data received from the Ministry of Finance).

Table 2: World Bank estimates of indirect transfers associated with water use for irrigation			
Item	**Unit**	**Current transfers**	**Hypothetical transfers** (if all costs were covered and the level of ISF maintained)
Water use for irrigation (average water use 1999–2002)	Million m^3	5,100	5,100
Unit water cost	som/m^3	0.06	0.20
Total DWM budget expenditure (2003)	Million som	314,122	1,020,000
Water use payments			
Unit payment	som/m^3	0.03	0.03
Total assessed payment	Million som	153.0	153.0
less non-payment	Million som	34.1	34.1
Net payment by farmers	Million som	118.9	118.9
Net transfer to farmers	Million som	195,222	901,100
	Million €	3.7	16.8
Source: Adapted from World Bank (2004a, 44)			

VodKhoz in Chui *Oblast* receives 5,000 som in ISF annually, while its payroll already amounts to 200,000 som. In addition, WUAs are fre-

quently indebted with *RayVodKhozes*, further aggravating the underfunding of the latter.

However, stating that funding for irrigation services is insufficient does not mean that public spending should be increased in this sector. In fact, the subsidization of irrigation already has questionable consequences in Kyrgyzstan, if it is assessed with regard to IWRM. Increasing subsidies instead of moving towards cost recovery from beneficiaries would risk worsening this situation.

The World Bank has assessed the level of current transfers to farmers from the national budget on the basis of the DWM's expenses as well as the transfers that would be needed to cover all capital and operating costs if the current level of ISF was maintained. The results indicate real transfers to irrigation of about 200 million som, or € 3.7 million, in 2003. Factoring in the roughly 120 million som of beneficiary financial contributions through the ISF, Kyrgyz irrigation is still subsidized at more than 60 %.[13] What is more, DWM staff estimates the adequate expenses for operation and maintenance at approximately 20 tyiyn/m^3.[14] This means that real transfers would have to increase to more than 900 million som, or € 16.8 million, annually, if cost recovery were not improved (cf. Table 2). Considering the financial constraints the Kyrgyz government will continue to face in the near future, it is unconceivable that the national budget will be able to cover these additional costs.

Moreover, an increase of public transfers to irrigation is not desirable either. According to the Dublin Principles, water supply is to be regarded an economic good. This particularly applies to water used for generating private economic benefit – like irrigation water – compared to drinking

13 The real amount of transfers is even higher, as the calculations exclude donor loans to WUAs. No more than 25 % of the loans are to be paid back by the WUAs themselves, the rest being borne by the national budget. In addition, the government – as the lending institutions' direct debtor – is the final guarantor, including the WUAs' 25 % share. If these loans are taken into account, subsidies to irrigated agriculture are nearer to 90 % of actual expenses, instead of the 60 % indicated by the World Bank calculations.

14 The World Bank states that the true costs might be significantly lower, since the DWM's estimates are based on the current structure of irrigation management, not accounting for possible improvements in efficiency thanks to the ongoing reforms (World Bank 2004a, 44). However, the Ministry of Finance also considers annual expenses of one billion som as necessary to finance irrigation services.

water, for example. As taxation of agriculture is very light in Kyrgyzstan (World Bank 2004a, 43), public financing of irrigation infrastructure cannot be justified as a possibly more efficient way of providing collective goods in the agricultural sector. On the contrary, compared to other economic sectors, the transfers represent subsidies to irrigated agriculture as such or, more precisely, subsidies to farmers who have access to arable land and public irrigation infrastructure. These transfers weaken the government's ability to finance essential public goods (such as health and basic education, a properly functioning juridical system, transport infrastructure etc.), and social transfers to the poorest segments of the population, including smallholders in rural areas.

Expectations of external help – be it from the government or from donors – also undermines water users' self-initiative. According to a Bishkek-based legal consultant for water issues, "*farmers still hope that the state will repair canals, clean canals, care for everything.*" Indeed, "*the Government should try to solve these problems*" is a typical statement heard from farmers. Alternatively, people concentrate their efforts on attracting funds from donor projects. A survey conducted by the Technical Extension Service (TES) Center for Agricultural Training and Extension in Kadamjay *Rayon*, Batken *Oblast*, revealed that almost 30 % of the farmers who saw a need for change expected help from donors to promote that change (TES 2005, 4–16). Even if it is rational – from the beneficiaries' point of view – to apply for donor funds given the current availability of grants and cheap loans, the predominant reliance on external financial support risks undermining the development of self-financing and self-governing structures in the future.

It has to be underlined, however, that the lack of a coordinated approach among donors contributes to this situation: "There is competition and sometimes no coordination between donors. Many projects represent a waste of money. People are getting spoiled and are only willing to take grants," a donor's employee noted. United States Agency for International Development (USAID), for instance, applies rather lax standards for the choice of WUAs to be supported in the south – possibly out of political considerations (tensions over water and land frequently occur in the south, i. e. the Ferghana Valley). The development banks, in contrast, put more emphasis on the financial sustainability of irrigation services. For example, WUAs have to qualify on a scale of seven 'milestones' to

receive loans, they are requested to pay back 25 % of the funds received within the OIP, and the World Bank's financial support to the WSUs within the OblVodKhozes and RayVodKhozes is gradually being phased out.

Increasing cost recovery

In order to end both unjustified subsidies to irrigated agriculture and the rent-seeking orientation of water end users, movement towards full cost recovery seems imperative. However, this implies additional burdens for farmers. Thus the crucial question is whether and how soon farmers will be able to bear these costs. On the one hand, when asked directly, many farmers already complain about the current level of irrigation fees, which they perceive as too high. Raising the ISF

"would be a catastrophe for us. Everything would break down, because farmers could not afford the water, and the deterioration of the infrastructure would proceed even faster. Then the yields are lower and the profits go down. Farmers would not be able to sustain their farms. They would abandon them, as it is already happening."

On the other hand, quantitative research usually comes to contrasting results: An IWMI study concludes that, taking into account overall productivity, farmers could afford to pay cost-covering fees, as long as they are able to sell their products (Ul Hassan / Starkloff / Nizamedinkhodjaeva 2004, 31).[15] And agricultural output as well as market access have continued to improve in the course of the last years, including in disadvantaged areas (World Bank 2004b). Investigating three WUAs in Batken, the above-quoted TES study found that "*despite the outstanding importance of irrigation water for crop yields, the ISF only makes up generally up to 3 % of the crop production costs*" (TES 2005, 3–14). In one particularly poor Batken WUA, people managed to build a canal with a length of more than ten kilometers without any external support, only to avoid water theft upstream (cf. Box 14). In order to finance the work, a contribution from each benefiting household was collected, indicating some room for increasing irrigation fees even in this region. In general, experts tend to believe that irrigation water supply is economically profitable in Kyr-

15 An additional study commissioned by the Asian Development Bank is to be published in late 2005.

gyzstan and could thus become financially self-sustaining over the long run.

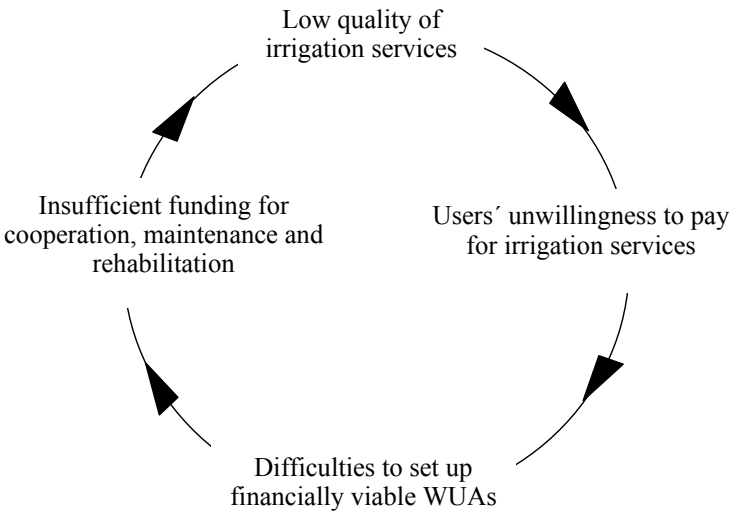
However, cost recovery should be aimed for not at the aggregate level but with a view to differences in the real supply costs of the respective irrigation systems. Up to now, tariffication is unitary: 3 tyiyn per cubic meter, with the exception of reduced fees for disadvantaged areas and the non-cropping season. Thus the effective subsidization inherent in this fee structure is uneven, being higher for less efficient irrigation systems and lower for more efficient irrigation systems. If fees were increased towards cost-covering levels, a unitary fee structure would lead to considerable cross-subsidization from better performing irrigation systems to more poorly performing irrigation systems. This would decrease economic efficiency by slowing down the reallocation of factors of production as a function of relative benefits. Thus donors have been demanding a differentiation of the fee structure according to real supply costs. Consequently, cost-covering fee levels have been calculated for 20 pilot irrigation schemes until September 2005. A differentiated fee structure is to be introduced in 2006.

Most difficulties in moving towards cost recovery appear to result from the persistent reluctance of farmers to pay, a situation, though, which may be changing. Mind change vis-à-vis the costs of water services has only just begun, and the non-payment of water fees is not always consistently sanctioned by cutting water supply.[16] Problems also exist concerning the time and regularity of payments. Some WUAs try to collect the money in advance or at least after every watering, others receive monthly payments or perhaps only two or three installments per year. The bulk of the fees is paid in late summer and autumn after the harvest, when farmers have most cash.

It seems that the unsatisfactory reliability of water services decreases farmers' willingness to pay. Due to past underfunding, the infrastructure is in such a bad state that irrigation water is not always delivered in time, or even not delivered at all. Thus farmers are not willing to pay the fees that

16 WUA staff may be reluctant to fully cut water supply, not only for social considerations, but also because they need to collect the total amount of fees fixed in the annual contract with the *RayVodKhoz*. If *mirabs* do not cut water supply, they may still be able to collect the fees after the debtor's next harvest.

Figure 8: Vicious circle in Kyrgyz irrigation services



Source: Own compilation

would be needed precisely to improve irrigation services (cf. Figure 8). In addition, the poorest farmers may face real difficulties in paying, in particular those who have only small land plots (cf. 4.3 for a discussion of social aspects).

In spite of this, fee collection is already improving, as the farmers´ willingness and ability to pay increase step by step. In the Chui *Oblast*, for example, 65 % of all fees were collected by WUAs in 2001, 74 % in 2002, 99 % in 2003, and 105 % in 2004, and farmers as well as WUAs were starting to repay their debts.[17] This seems to be a general tendency throughout the country, although the persistence of payments in kind de-

17 These – indeed very positive – numbers are based on interviews. Other sources indicate lower rates. For instance, Alymbaeva specifies a 53 % total average collection rate for WUAs (quoted in Sehring 2005, 31). However, data obtained in southern *rayons* indicate a general tendency towards rising collection rates.

preciates the value of fees collected. In 2004, on national average, 60 % of total fees (ISF and WUA fees together) were paid in kind, 30 % in cash, and 10 % in labor (data received from the Ministry of Finance).[18] Yet in-kind payments are decreasing as well as market access improves, and donors are pressuring for fee collection in cash. In sum, WUAs will need additional time until they become financially viable. WUA federations cannot be expected to be financially self-sustaining right from the beginning either. But within the next 15–20 years, chances are good that cost recovery – at least at tertiary and secondary levels of the irrigation system – can be achieved.

A further problem involved in achieving financial sustainability for Kyrgyz irrigation services are the high taxes to which WUAs are subject. They have to pay taxes on profits, on wages, a special tax to the MEES as well as contributions to the social fund. In addition, WUAs pay a local tax and a road tax to the *ayil okmotus*. In particular the profit tax is difficult to justify, as – according to the law of 2002 – WUAs are non-profit organizations.[19] However, an early tax exemption expired in 1999, and needed changes in the Tax Code have not been made. This significantly undermines the capacity of WUAs to become financially self-sustaining.

Kyrgyz policy makers are generally convinced that there is no alternative to moving further towards cost recovery. However, the March 'Revolution' may slow down the pace of reform. Since it was mostly the rural poor who participated in the events (ICG 2005, 12), one might expect growing reluctance on the side of the new government to further reform steps that would additionally burden farmers. The government might adopt

18 Thus WUA and *RayVodKhoz* employees frequently receive part of their salary in kind (sometimes even in form of reduced water fees for their own fields). This is likely to decrease staff motivation, further diminishing efficiency of irrigation management. For some time, the persistence of in-kind payments seems to have been partly motivated by rent-seeking on the part of water officials: Originally fees from water end users were collected in cash. WUA managers then converted these funds into products at market prices, which were significantly below the official equivalents for in-kind payments. Fees to the *RayVodKhozes* were paid with these products. The rents gained from this mechanism seem to have been shared across the water management hierarchy. Losses in the form of bad infrastructure were borne by the water end users.

19 WUAs do not distribute profits to their members. In conceptual terms, it would not make sense either to transfer irrigation water supply to profit organizations, as the canal system automatically creates constellations of natural monopolies.

a more populist policy to avoid new civil unrest emanating from rural areas. The donors could also become more conciliatory towards the new government in order not to destabilize the country further. However, first indications do not support these expectations: The new government has explicitly confirmed the former government's pledges to donors. The latter are also sticking with their earlier conditionalities, while deliberate non-compliance by the Kyrgyz government is difficult to imagine considering its dependence on international funds. However, the continuing replacement of staff within the Kyrgyz administration (Freitag-Wirminghaus 2005, 10) will decrease the government's ability to implement agreed-upon reforms in a timely manner. Finally, according to the new Water Code (Art. 48), the Kyrgyz Parliament (*Jogorku Kenesh*) will have to confirm ISF increases on request by the DWM. Thus deputies could slow down the reform process in the water sector, as happened with the adoption of the new Water Code in the past.

Possible improvements / Recommendations

In consideration of the key challenges identified above, the following actions should be adopted to improve the financial sustainability of Kyrgyz irrigation management:

— Recommendation to the Kyrgyz government: **Move further towards full-cost pricing of irrigation water supply.**

  Increased cost recovery is without realistic alternative in the Kyrgyz irrigation sector if water provision is to be improved. While farmers frequently oppose fee increases – as would be expected – they suffer even more from unreliable water supply. The government is and will not be able to bear the necessary capital and operational expenses. In addition, it is difficult to justify why the national budget should subsidize an economic sector that is supposed to be one of the main pillars of the Kyrgyz economy.[20] Thus the real issue is not if but how fast water user fees should be increased. ISF should be augmented slowly to really set a strong incentive to save irrigation water and use efficiently the quantities abstracted. It can be assumed that the ISF is the best trigger for such a development as it could also lead to private investment in small-scale water-saving infrastructure at farm level. In

20 Agriculture accounts for more than 35 % of the country's GDP as well as for slightly more than half of its labor force (IMF 2005b, 4 and 16).

consideration of continuing agricultural growth in Kyrgyzstan,[21] chances are good that farmers will soon be able and increasingly willing to bear a larger share of water supply costs. One possibility is also the introduction of progressive fees that would require large consumers to pay more than small peasant farmers. However, special care should be taken to avoid social hardship for the poorest segments of farmers (cf. 4.3.1).

— Recommendation to the Kyrgyz government and donors: **Focus support for agriculture on improving farms' profitability in order to demonstrate that increased irrigation fees can be more than offset by increased profits.**

Realization of the full economic potential of Kyrgyz agriculture is hampered not only by bad irrigation services but also by insufficient availability of other inputs (fertilizer, pesticides, high-quality seeds, veterinary services, etc.) and know-how. Further improving access to output markets offers some potential for increasing farm profitability as well. Thus support programs for improving agriculture's institutional and market environment, including demand-oriented extension services, might ease the burden of increased tariffs for farmers and strengthen their ability and willingness to pay: "*Focused programs to improve crop production and marketing among emerging WUAs would provide strong support for increasing water fees, and help to demonstrate that the increased costs of an improved irrigation system can be more than offset by the benefits*" (World Bank 2004a, 45–46).

— Recommendation to the Kyrgyz government and donors: **Continue supporting the rehabilitation of irrigation infrastructure** in order to facilitate its transfer to users.

As the transfer of irrigation infrastructure to water users' organizations (WUAs and future WUA federations) is slowed down by its general state of disrepair, continued support for infrastructure rehabilitation is needed. This will also help to break the vicious circle of irrigation services. Preferably, donors should provide funds in the form of grants, as the government's debt burden has already reached critical levels. WUAs that receive funds for infrastructure rehabilitation should nevertheless be asked to pay back (part of) the funds re-

21 It is too early to predict the exact economic consequences of the revolutionary events of March 2005. Until now, negative fallout has been limited. In addition, possible negative effects are likely to affect urban services much more than agriculture.

ceived. This money could then be used to set up a 'National Irrigation Rehabilitation Fund' that would provide rehabilitation loans to further WUAs. Donors and water managers at all levels should also encourage the introduction of new water-saving irrigation techniques. Economic incentives such as tax deductions or reduced water fees could be a strong stimulus for private water users to invest in such measures.

4.3 … of social externalities

According to IWRM, water management has to integrate not only ecological and economic externalities but also the social implications it may have. This includes consequences of water management for poverty and human health, but also for issues like gender relations and conflict resolution.

4.3.1 Poverty

Thanks to a rapidly growing economy, the Kyrgyz poverty headcount index has decreased rapidly in recent years, from 52 % in 2000 to an estimated 35 % in 2004 (IMF 2005a, 5–7). However, extreme poverty continues to be a concern in Kyrgyzstan. Rural areas are especially poor, with a poverty headcount significantly above the national average (World Bank 2004a, 31, cf. Box 12).[22] Considering the predominance of agriculture in the rural economy, irrigation management thus has a particular importance for the incidence of poverty in these areas (Bucknall et al. 2003, iii f.): "*The highest indices of extreme poverty can be found in those areas that have suffered severe soil degradation and water shortages. This shows that there is a direct link between improved water management (especially at the local level), poverty reduction and sustainable development*" (Spoor 2004, 37).

Potential positive consequences of the ongoing reforms in Kyrgyz irrigation management on the incidence of rural poverty include a more reliable provision of irrigation water to poor farmers. Better irrigation services could enable them to increase their yields and to take higher risks to improve the profitability of their farms. Second-order effects on rural poverty

22 70 % of the Kyrgyz poor live in rural areas (Freitag-Wirminghaus 2005, 4).

could emanate from the general upswing of the rural economy resulting from increased overall productivity of irrigated agriculture: As the poorest of the poor have only small land plots and therefore depend on additional income to secure their food supply (World Bank 2004a, 34), they will gain significantly from additional job creation in on- or off-farm activities.

Box 12: Causes and consequences of rural poverty in Kyrgyzstan

Extreme poverty among farmers mainly results from lack of agricultural knowledge, low food prices, high input costs, and still underdeveloped (even though improving) markets. The cultivation of profitable cash crops in particular demands a higher range of inputs like fertilizer, pesticides, and machinery, which many poor farmers cannot afford. Also, poor farmers are not able to upgrade their farming and irrigation knowledge in order to increase yields, because they cannot afford the trainings offered by extension services. Thus they miss the chance to improve their agricultural knowledge and consequently their income: "*What farmers grow depends on what they can afford. Poor farmers grow what they have grown forever and what they are familiar with. They cannot adjust their production to the market. The richer ones are able to grow what is profitable and can be sold on the market,*" as a WUA director in the north explained.

Due to these obstacles and a rather risk-adverse approach towards agriculture, the poorest tend to remain subsistence farmers. Alternatively, young and middle-aged men in particular migrate to urban areas, to the capital Bishkek or even to neighboring countries (mostly Kazakhstan and Russia) in order to find alternative employment. An estimated 600,000 Kyrgyz are working abroad, almost 12 % of the country's population.

Source: Bucknall et al. (2003, 15–16), own field research

Risks of exacerbated poverty, in contrast, could result from increased ISF and WUA fees on the one hand and the factual discrimination of poor farmers in decentralized water management on the other. Although it seems both unavoidable and desirable to raise water fees (ISF and WUA service fees) to cost-covering levels in the long run, a key question is how best to mitigate social hardships for poor farmers. Currently, there is no

differentiation of fees between poor and non-poor farmers as such, the only possible exception being the above-mentioned reduced ISF of 1 tyiyn in remote areas. This actually constitutes an additional – although badly targeted – subsidy to poorer water users, as the poorest segments of farmers tend to be concentrated in these areas. A recent World Bank study suggests that subsidization of irrigation services in disadvantaged regions could be an appropriate instrument of social policy: "*Many areas, however, appear not to be inherently profitable, and millions of people rely on agriculture in these areas. […] This initial analysis indicates that in the Kyrgyz Republic, rehabilitation would be cheaper than the simplest option for reducing the social tension – providing cash transfers*" (World Bank 2004a, 35). However, this suggestion becomes questionable if the limited room for maneuver in the national budget and the ecological externalities of a broad and long-term subsidization of irrigation water supply are taken into account. Furthermore, additional subsidization of remote areas is already scheduled to be phased out when the expected differentiation of irrigation fees based on the real supply costs of irrigation schemes comes into effect (cf. 4.2.2).

The poorest farmers already face difficulties in paying their fees in time, and sanctions against debtors now increasingly appear to be enforced by WUA staff: Allocation of the full amount of water ordered by farmers, and especially its timely delivery, is often conditioned on the punctual payment of water fees. This leads to factual privileges for better-off farmers in water allocation. Although kinship ties and respect for elders prevent sanctions against debtors from being enforced draconically, the 'first pay – first serve' principle seems to have gained ground within WUAs. Even though debtors normally receive a minimum amount of irrigation water, they usually have to wait for their turn until everybody else is served. This can be a significant burden for poor farmers: Without sufficient amounts of irrigation water, their yields are at risk of declining, diminishing these farmers' chances to escape from poverty.

Thanks to their financial autonomy, WUAs are free to handle these problems internally as they deem appropriate. Thus in some WUAs exceptions are made for very poor farmers, who enjoy reduced WUA fees. This, however, risks further diminishing the total budget of the usually cash-strapped WUAs. In addition, poor farmers are sometimes granted the right to pay their fees in the form of labor. This work has to be carried out in addition

to *ashar* activities – a traditional form of collective work – which are compulsory for all WUA members.[23] But payments in kind have a limited potential to ease financial burdens of poor farmers, as possible tasks are mostly limited to earthen, tertiary infrastructure. In contrast, the ISF due to the *RayVodKhoz* can in most cases not be paid in labor, as most work on the primary and secondary infrastructure has to be done by specialists with heavy machinery.

Particularly in times of water scarcity, bribery and personal contacts seem to play a major role in decisions on water allocation. Generally, *mirabs* have fairly large discretionary powers in the day-to-day allocation of irrigation water. Taken together with their extremely low salaries, they are vulnerably to bribery. In fact, bribery seems to be a customary tool used to gain access to irrigation water. Thus better-off farmers generally have the means to gain preferential access to irrigation water: **"***It is just the elites, the 'crème of the community', who get water easily, those who have enough money. Simple people do not get water this easily,*" a group of farmers in the south complained. The better-off farmers are also likely to be the most influential persons in the local community, adding further to their privileged access. In addition, kinship plays an important role in water delivery: Family ties with WUA staff can provide guarantees for water supply. All these informal mechanisms decrease the transparency of allocation decisions and risk contributing further to the disadvantaged position of the poor.

Possible improvements / Recommendations

Integration of effects on the incidence of poverty should be a priority for decision makers in the Kyrgyz irrigation sector. The following actions seem advisable in order to minimize negative social consequences of further reforms:

— Recommendation to the Kyrgyz government: **Raise and better target social transfers in rural areas.**

  Cost recovery from the beneficiaries for irrigation services should be an aim in the long run (cf. 4.2.2). This will, however, be associated with considerable hardship for poor farmers. It is difficult, though, to

23 Only farmers who are able to contribute with machinery to *ashar* work receive reductions in their water fees in return.

exempt the latter from (part of) their fees, because this might impair the willingness to pay of other farmers. The best long-term solution to this problem would be to raise and better target public transfers to the poor within the system of social assistance. The European Union is currently assisting the Kyrgyz government in reforming the system of social transfers in line with this suggestion. As the implementation of reforms will take time, however, other solutions have to be found in the short run in order to alleviate the payment problems of poor irrigation farmers (cf. below).

— Recommendation to WUAs: **Create internal mechanisms of cross-subsidization.**

Unless the system of social transfers is improved, another – politically challenging – possibility to support poor farmers would be to establish some kind of 'social fund' within WUAs in order to exempt selected beneficiaries from payments of ISF and WUA service fees. This fund would function as a mechanism for cross-subsidization from rich to poor farmers and could be introduced individually by every WUA. Better-off farmers would pay irrigation fees above supply costs. These additional funds would then be used to pay the fees of poor farmers, thereby avoiding net losses to WUA budgets, which would occur if poor farmers received water for free or paid reduced fees. In addition, there should be special regulations allowing poor farmers to pay their WUA fees in labor (canal cleaning etc.). Clear-cut criteria for the eligibility of poor farmers for these social mechanisms should be developed by the WUAs.

— Recommendation to WUA members and Councils: **Facilitate the smooth functioning of WUAs by increasing salaries and upgrading equipment of WUA employees with a view to making water allocation more transparent and equitable.**

WUA employees and, in consequence, WUA irrigation services suffer from low levels of salaries and insufficient equipment. This undercuts WUA staff motivation and makes *mirabs* vulnerable to bribery. More rewarding salaries and better equipment (measurement, transport, and communication equipment, office space) – both to be financed by increased WUA fees – could boost employee motivation and thus the quality and equity of water allocation. This would reduce discrimination of the poor and decrease the frequency of conflicts between water users.

— Recommendation the Kyrgyz government and donors: **Focus extension services on poor farmers in order to raise the profitability of their farms.**

  Agricultural knowledge is concentrated among a limited number of people who were educated in Soviet times (former *kolkhoz* managers, hydro-technicians etc.). Poor farmers are mostly those with insufficient agricultural know-how. To help these farmers improve their agricultural knowledge, extension services should be further developed and focused on the needs of the poorest, e. g. with trainings on the cultivation of cash crops. Funds should be made available to subsidize the attendance of poor people at such trainings.

4.3.2 Health

The key issue bearing on the interaction of irrigation management and human health is drinking water supply. Links between the two sectors have gained significance in connection with the degradation of both irrigation and drinking water infrastructure since independence. While in the cities households have individual taps and drinking water supply is reliable, rural piped water supply mostly consists of taps in the streets, which tend to break down regularly.

In the course of the last 15 years, 95 % of rural piped systems have broken down, as the now dismantled *Kyrgyz Ayil Suu* was not able to uphold previous levels of maintenance and repair. Pumped drinking water supply is particularly vulnerable, as power cuts and high electricity costs impede the proper functioning of pumps. Thus the rural population is forced to shift to other – less secure – sources of drinking water. Accordingly, drinking water is often taken from irrigation canals, as the latter are the most readily available and accessible source of water.[24]

The fact that irrigation water is frequently polluted by drainage water and organic pollutants from livestock breeding and human settlements has led to a significant increase in gastrointestinal diseases, epidemics of viral

24 However, there are regional differences in rural drinking water supply. The situation seems to be better in the north than in the south of the country. Particularly the Chui *Oblast* has relatively better water supply infrastructure. There are piped systems in many villages and people are thus less often dependent on irrigation canals for their drinking water supply.

hepatitis and typhoid fever during recent years (UNECE 2000, 77f.). These diseases occur especially in the south of the country, where the provision with safe drinking water is worst.

Besides health problems linked to drinking water, inappropriate irrigation techniques also favor the spread of disease vectors. In particular, the incidence of malaria has risen in the south of the country during the last decade. In addition to the deteriorated public health system, this development can be traced back to additional mosquito breeding grounds provided by reservoirs and waterlogged areas.

These interactions between irrigation and public health do not seem to receive adequate attention from authorities. At the national level, health problems are barely considered by the water administration. Drinking water supply in particular does not come in for consideration by the DWM, as it was – and continues to be considered – separate from irrigation water supply. Accordingly, the different spheres of water management are more or less divided: Drinking water is under the overall responsibility of the Ministry of Health, while the DWM is in charge of providing irrigation water. The interconnections between irrigated agriculture, drinking water, and health risks thus cannot be taken into account systematically. However, this inadequate institutional arrangement has been improved with the creation of the Department of Rural Water Supply within the MAWMPI, which guides and oversees the donor-funded rehabilitation of rural drinking water systems. Still, there tends to be very little communication or coordination between the ministries and departments concerned (cf. 5.1.1).

This division of labor between the different line ministries and other organizations involved in the monitoring of water quality and disease control thus adds to the obstacles to implementation of IWRM. This is also reflected at the regional and local levels: The *OblVodKhozes* and *RayVodKhozes* are mainly concerned with delivering water to agricultural users. They have no competence regarding health problems. WUAs as well are mono-sectoral, exclusively dealing with irrigation water supply (Ul Hassan / Starkloff / Nizamedinkhodjaeva 2004, 18f.; Wegerich 2000, 16f.). Despite the above-described factual links between drinking water and irrigation, WUAs work separately from the newly created Drinking Water Unions (DWUs). Water users themselves are sometimes unaware of water-health interactions and not informed on how to protect themselves.

In addition, neither are concrete initiatives taken nor are there efforts made to raise awareness at the local level concerning health impacts of irrigation management like the spread of disease vectors due to waterlogging or consumption of irrigation water as drinking water.

Possible improvements / Recommendations

In consideration of the above-mentioned shortcomings in integrating irrigation and public health, the following improvements could be made:

— Recommendation to the Kyrgyz government: **Put more emphasis on health issues in irrigation management by ensuring appropriate coordination between the authorities concerned.**

  Health aspects of irrigation management are not adequately represented in decision-making within the DWM and its regional branches, thereby contributing to the spread of water-borne diseases. In order to improve the integration of health aspects, better cooperation between the Ministry of Health, the DWM and the Department of Rural Water Supply should be aimed for. One important step in this direction will be the formation Water Councils with representatives of all water use sectors and concerned authorities, as provided for in the new Water Code.

— Recommendation to *ayil okmotus*: **Raise awareness among the local population regarding health aspects of irrigation management**.

  Local water managers and water users should be better informed about health hazards and risks arising from inappropriate water use. Awareness raising could be concentrated on older people and *aksakals*, because they have the particular leverage needed to change peoples' minds. Apart from this, the topic of water pollution and water-borne disease vectors could be included in school and university curricula.

4.3.3 Gender

Social externalities of water management may also arise from gender-related issues, like the neglect of women's water needs or the underrepresentation of women in decision-making organs. In rural Kyrgyzstan, there has been a considerable rollback in women's emancipation since the end of the Soviet Union (Freitag-Wirminghaus 2005, 2–3). Concerning irriga-

tion management, water issues are perceived as men's business. Traditionally, women do not deal with these questions at the farm level. "*It is a shame for a woman to go out to work in the field and care about the watering. It is the father who talks to the* mirab *and cares about the watering together with his sons,*" as a farmer's son in the south stated. Usually, women engage in irrigation management only if there is no man left in the family able to do so. Nevertheless, many women depend on irrigation water, as they are responsible for the small garden plots of their families. At present, owners of these plots are not regarded as ordinary water users and therefore not included in water use plans. As garden plots are mainly cultivated by women, they thus seem to be systematically disadvantaged in water management. Therefore, it appears that women are frequently responsible for breaking holes in irrigation canals to irrigate their garden plots.

Looking at women in water management at administrative and WUA level, they, if at all, occupy subordinate administrative positions. Most often, women are accountants, which is historically rooted, as this was a women's domain in Soviet times. Women are rarely elected as representatives to the general assembly, WUA Council members or even recruited as WUA directors. The same applies to WUA membership. Women are underrepresented as WUA members (and even as members of DWUs, although the topic of drinking water is of the highest relevance to their daily lives). Usually, household heads become WUA members, a circumstance which explains the fact that most female members are widows.

Although women are generally underrepresented in Kyrgyz water management, there is still a considerable divide between the north and in the south of the country. In the more 'Sovietized' and 'Russified' north, one can find at least a few female WUA directors (5 directors of 102 in Chui *Oblast*, for example). This is not the case in the south. Here, women are even less active and leave water management at all levels almost entirely to men, even though they have a huge share in fieldwork. This divide is also rooted in different cultural backgrounds: While the originally nomadic north was less permeated by Muslim thought, the predominantly Uzbek and traditionally sedentary south is more rooted in Islam.

Donor projects also tend to overlook gender issues: Women are in most cases neither recognized as a group of stakeholders nor properly involved in water management. Components focusing especially on women or

measures to encourage their participation are often lacking. Even the IWRM Ferghana Project, with IWRM in its project title, has only recently begun to think about including gender issues. By contrast, one can find many women active in NGOs working in the field of agriculture and water management.

Even though agriculture as such and irrigation management in particular are perceived and handled as a men's task in Kyrgyzstan, it seems not to be as difficult to increase the involvement of women as it is in some of the more conservative neighboring countries. At least in the north of the country, women are often not so much prevented from taking part in water management, as they themselves perceive it as being none of their business. "***Women*** *often say: ´Water is up to men.´"* as a representative of USAID put it. Men tend to be relatively unemotional about this topic. *"It is their own choice, they could participate, if they wanted to,"* a farmer in the north said. Therefore, 'leaving the path' and making women participate might not be too difficult to accomplish. Once women are persuaded of the relevance of their participation, they should be able to make themselves heard. In the course of our research, we met women who were quite engaged and emotional on the topic of water management. In places where at least some women already participated in WUA general assemblies, they proved to be active and outspoken in public, illustrating the potential for increased women's participation.

Possible improvements / Recommendations

In order to better integrate gender issues into Kyrgyz water management, the following measures could be undertaken:

— Recommendation to donors, *ayil okmotus* and WUA staff: **Increase women's participation in water management.**

  Encouraging women to participate in water management has neither been on the agenda of donor projects nor have local water administrations or WUA staff taken corresponding initiatives so far. Women should, however, participate more actively in order to make their specific needs heard. Therefore, women's participation should be included in donor programs focusing on the establishment and promotion of WUAs. The gender balance might even become one of the 'milestones' for WUA-formation put forward by the World Bank to evaluate WUA performance. WUA staff and *ayil okmotus* should en-

courage women to become WUA members and invite them explicitly to WUA foundation meetings, general assemblies, etc.

— Recommendation to WUAs: **Integrate garden plots into ordinary water allocation procedures.**

  Owners of small garden plots – mostly women – should be included in water management and become ordinary members of WUAs to ensure that their water needs receive consideration to prevent conflicts over water stealing. Should this additional number of members overburden WUAs, representatives could be elected, as is already practiced in WUAs in the south of Kyrgyzstan. As full WUA members, and in order to strengthen their position within the WUAs, owners of garden plots should be fully liable for fees for water abstraction.

4.3.4 Conflict management

Negative social externalities of water management are induced by a lack of conflict management mechanisms, a circumstance which can lead to social unease and escalating tensions. Conflicts occur among farmers, between farmers and WUA staff, as well as between WUAs. The reasons for conflicts include:

— *Water scarcity*, leading to insufficient provision with irrigation water. Scarcity mainly occurs in spring, during the first irrigation period, and in hot summers, but also when irrigation infrastructure is unable to deliver enough water to all farmers due to the opening up of new land or disrepair of canals. Lack of coordination of planting patterns among neighboring farmers also leads to water scarcity.

— Water stealing, a widespread tool for gaining access to irrigation water in times of water scarcity. *"Water theft is so common, that it can be described as a local institution itself as it represents a widely not confronted rule of behavior"* (Sehring 2005, 33). Division points are frequently guarded in order to prevent the manipulation of floodgates. Water theft most often occurs in lower regions with higher population pressure, more users, and less water availability.

— *Unequal water distribution:* Both between different WUAs and between farmers within one WUA, water allocation can be perceived as

Box 13: Dispute management organizations and their relevance

There are different organizations involved in irrigation-related conflict management. Formal organizations include the DWM and its regional branches, that is the *OblVodKhozes* and *RayVodKhozes*, as well as the *ayil okmotus*. In addition, WUAs and their staff play a key role at the local level. Furthermore, there are other, 'traditional' organizations like the *aksakal sotu* (court of elders) involved.

The ***aksakal sotu*** does not have any primary responsibility for the management of water conflicts. Whether *aksakal sotus* become active in conflict management appears to depend both on the circumstances and on the individual members of the courts. The influence of *aksakal sotus* can be traced back to their moral power, which is rooted in traditional deference to elders.

The *RayVodKhoz* is not heavily involved in conflict management, even though *RayVodKhoz* staff mostly point to this role when asked directly. In practice, very few cases of conflict management by the *RayVodKhoz* were found. On the contrary, the poor performance of *RayVodKhozes* frequently is itself a cause of conflicts.

Even though the ***ayil okmotu*** is legally not responsible for irrigation, it is widely regarded as highly relevant for solving conflicts among water users. Especially in drought periods, the *ayil okmotu* is highly involved in conflict management. Farmers address the *ayil okmotu* and its agriculture and water specialists when they are faced with a particular water problem or conflict. Sometimes *ayil okmotus* establish special committees to deal with these issues. The *ayil okmotu* represents a rather neutral instance, able to solve conflicts not only between farmers but also between farmers and WUA staff or the *RayVodKhoz*.

The WUAs do not at present play an important role in conflict management. Their **Conflict Resolution Committees**, which are supposed to be set up in every WUA, do not function properly in most cases, sometimes only existing on paper. They are unknown to most farmers, who mainly address the *ayil okmotu* or *ayil bashis* (village heads) in cases of conflict. Since WUAs are still weak and many conflicts occur between farmers and WUA staff, farmers seem as yet unwilling to accept a WUA body to settle such conflicts.

The ***mirabs*** are involved in conflict prevention mostly because they are the ones farmers address with their water supply problems in the first place. This mainly concerns conflicts between different farmers over water. The *mirabs* may, for instance, resolve these problems according to the '*avran'* method of water distribution (cf. 5.3.2). This method appears to be respected by the farmers, as it operates along clear criteria. However, *mirabs* sometimes seem to be reluctant to engage in water conflicts, leaving conflict management to the farmers themselves.

Source: Own field research

unequal and unjust. Indeed, poor and less influential farmers seem frequently to be discriminated, and some WUAs may have preferential access to water thanks to the upstream location of their service areas.

The management of these and other conflicts appears to be problematic in many places, making of irrigation management a sensitive area. Arbitrariness regarding conflict resolution, further aggravated by technical constraints, exacerbates conflicts. Farmers report that fights flare up when too many people queued up waiting for their irrigation turn. Designed for *sovkhoz* and *kolkhoz* farms, irrigation systems are often technically incapable of delivering agreed-upon amounts of water to small plots. Furthermore, the lack of water measurement devices makes it difficult to resolve disputes on the basis of reliable data (Ul Hassan / Starkloff / Nizamedinkhodjaeva 2004, 21; DFID 2003, 3–5).

While the Law on WUAs explicitly calls for the set-up of Conflict Resolution Committees, formal dispute settlement mechanisms are usually absent or inactive (Sehring 2005, 32). In addition to this, farmers often do not regard WUAs as organizations capable of resolving water conflicts. Various other stakeholders become involved, mainly *ayil okmotus* and *aksakal sotus,* for lack of conflict management mechanisms within the irrigation sector (for an overview of dispute management organizations, cf. Box 13).

However, this rather spontaneous organization of conflict management appears to be suboptimal. One key problem is the lack of rule enforcement. The juridical system is supposed to be the last instance for settling water conflicts, but it is not accessible for ordinary people. Even if competent bodies take formal decisions, they can still be circumvented by bribing water managers or simply by stealing water. The result is a lack of trust in the equity and reliability of conflict management, and this in turn leads to excessively high transaction costs in conflict resolution.

Trust is further undermined by the fact that conflict settlement is frequently achieved on the basis of 'victory' of one party over the other, an approach that does not allow for mutually rewarding win-win solutions. Farmers tend to concentrate their efforts on getting enough water for their individual fields, regardless of effects on other farmers' needs. Attempts to reaching solutions agreed-upon by consensus are rare. Thus farmers can

Box 14: Case study: suboptimal solution to water theft from the Nurgaziev canal

The Nurgaziev canal is part of Kyrgyzstan's primary irrigation infrastructure, abstracting its water from the Shahimardan river. The latter originates in the Kyrgyz Kara-Shoro mountains and runs through Kadamjai *Rayon* towards the Ferghana Valley, where it crosses the border to Uzbekistan. In the course of the decentralization process in the Kyrgyz water sector, two WUAs were set up within the service area of the Nurgasiev canal, roughly corresponding to the territory of upstream *ayil okmotu* Khalmion on the one hand and the territory of downstream *ayil okmotu* Alga on the other. The former is the bigger (3,120 ha) and richer one, whereas Alga is smaller (750 ha) and is faced with more difficult agricultural conditions.

Conflicts over irrigation water seem to constitute a real problem in the service area of the Nurgaziev canal. In particular, the inhabitants of Alga *ayil okmotu* have accused the inhabitants of Novgardan village in Khalmion *ayil okmotu* of unsanctioned water abstraction (locals avoid speaking of "water stealing"). Their Uzbekistani neighbors – situated just a few hundred meters downhill from the Nurgaziev canal near Novgardan village – are also suspected of water stealing. The apparent impossibility to solve this problem in a consensual way has led to the construction of a second, earthen canal by the inhabitants of Alga *ayil okmotu* in 1999. This canal starts at kilometer 12 of the intake structure and stretches 10 km parallel to the lined Nurgaziev canal. Water losses from this earthen canal amount to more than 40 %, but inhabitants of Alga *ayil okmotu* regard it as a rational solution to the water stealing problems. In their opinion, it is also a cost-rational way of dealing with the issue, as it makes it possible to save supervision staff that would be needed to prevent water stealing on a 24-hour basis. In addition, even these expenses would not provide guarantees against water stealing, in consideration of recurrent problems involving guard reliability (bribery, alcohol abuse etc.).

This 'solution' to water-stealing problems, i. e. the new earthen canal, is certainly not an optimal one, as the associated water losses would be avoidable if a universally accepted agreement between the affected water users were found. Such an agreement would constitute a win-win solution, as total water availability along the Nurgaziev canal would increase, thus reducing the problem of regular water scarcity Alga already suffers from. However, a supply-side or 'physical' approach towards water provision appears to prevail in the area. "Despite existing schedules, receiving water for irrigation means to 'run after the water' and to 'drive it' […] to the plot. […] Because of existing and seemingly unchangeable power relationships, people prefer infrastructure solutions that physically prevent water abstractions and increase the total amount of water" (Bichsel 2005, 58). Farmers try to physically ensure their own water supply, unwilling to rely on the *RayVodKhoz*, the upstream WUA, or others. In essence, the difficulties in finding a better solution thus seem to arise out of the non-

reliability of formal institutions (*RayVodKhoz*, militia, courts) in combination with insufficient social capital linking the two *ayil okmotus*. Both functioning legal enforcement mechanisms and inter-community social linkages would facilitate the development of trust, which is indispensable for finding and implementing common agreements. However, if both formal control mechanisms and social capital are lacking, problems involving cheating are difficult to overcome and, in consequence, win-win solutions hard to achieve.
Source: Christine Bichsel, NCCR North-South researcher on local water conflicts in Central Asia (personal communication), own field research

not trust in the future willingness of their neighbors to abide by water distribution arrangements. This means that guards frequently have to be deployed to control distribution points, which significantly raises the costs of conflict settlement. However, even guards do not seem to provide guarantees for water supply, since they can be bribed or physically overwhelmed by competing water users. In consequence, physical solutions to conflicts are preferred, even though such 'solutions' further raise transaction costs. In one WUA in Batken *Oblast*, for example, people decided to dig a new, costly canal in order to prevent water stealing by others (see case study in Box 14).

Possible improvements / Recommendations

In light of the problems analyzed above, the following recommendations can be made for better conflict management in the Kyrgyz irrigation sector:

— Recommendation to the Kyrgyz government: **Increase the transparency of decisions on water allocation at all levels.**

  In order to avoid conflicts, the transparency of water management has to be assured. This includes clear criteria for water distribution and water delivery in times of water scarcity and publication of water distribution plans.

— Recommendation to WUAs and WSUs: **Strengthen the WUA Conflict Resolution Committees and turn them into the key instance for conflict settlement in local irrigation management.**

  In order to increase the authority of the Committees and of WUAs in general, not only for the farmers but also for the *aksakal sotu*, some *aksakals* could be included in its staff. In general, the Conflict Reso-

lution Committees should aim at facilitating consensual agreements between the parties with a view to strengthening mutual trust and facilitating enforcement of decisions, even in absence of a well-performing juridical system.

5 Regulatory integration

The following chapter deals with the managerial dimension of IWRM. The first part will assess the extent to which the principle of 'decentralization and participation' has been translated into reality in the Kyrgyz context (5.1). The rationale behind this principle is to bring water management nearer to the users. The following section will examine the principle of 'information and communication,' which considers the availability of adequate data as a central prerequisite for efficient water management (5.2). In a last step, the focus lies on aspects regarding 'demand management' (5.3). The latter constitutes a shift away from the traditional supply-side perspective to water management aiming at enhancing water use efficiency and promoting water-saving behaviors and technologies.

5.1 Decentralization and participation

Decentralization requires water management to be organized according to the principle of subsidiarity. Achieving an appropriate division of labor between different administrative levels requires competencies to be transferred to the lowest appropriate level. The first part of this section will deal with the question of whether and to what extent the principle of subsidiarity has been realized in Kyrgyz water management.

The main idea underlying the transfer of competencies to the lowest appropriate level is to bring water management nearer to the users. An important instrument to reach such an ambitious objective is to strengthen bottom-up approaches to water management. The second part will thus deal more specifically with questions of Kyrgyz water users' attitudes towards participatory water management and their actual influence on decision-making.

5.1.1 Division of labor according to the principle of subsidiarity

As Kyrgyz water management is characterized by a multitude of involved organizations, it is not always easy to clearly define their respective tasks and functions. To gain insight into how Kyrgyz water management actually works, a closer look will be taken at the functions assigned to the different administrative levels, their ability to perform those functions, and the relations between them. The analysis will begin with the national level. It will then move on to the *oblast* and *rayon* levels before dealing in further detail with the local level, i. e. with WUAs and other stakeholders.

National level

Including the DWM, the currently most important organization dealing with water management is the MAWMPI. With water management considered institutionally as part of agricultural policy, the DWM suffers from internal divisions between dominant agricultural experts and less influential water specialists. Further stakeholders at national level are, *inter alia*, the Ministry of Ecology and Emergency Situations (MEES), the Ministry of Health, the Ministry of Finance, the Ministry of Geology, and the State Agency for Hydrometeorology (*Gidromet*).

At present communication between these organizations is rather deficient. The consequences of this situation become manifest, for instance, in the relationship between the DWM and the MEES: While the first is responsible for water abstraction, the second is in charge of regulating water pollution. However, compared to the DWM, the MEES is of minor importance. The strict separation of tasks and the resulting need for cooperation and coordination between both ministries – or more precisely: its lack – tend to further marginalize the MEES. The effectiveness of environmental protection is therefore at risk of being undermined.

The general lack of horizontal communication seems to be partly due to top-down management traditions inherited from Soviet times. The problem becomes even more obvious when we take a closer look at the dissemination of information between state bodies. Interestingly, Kyrgyz water management does not really seem to suffer from a lack of information, but rather from an insufficient information transfer between different stakeholders. This is well illustrated in the example of two national re-

search institutes in Bishkek, which produce similar GIS maps on water resources and water quality. Both reportedly base their maps on data which they receive from the same state employee. Yet none of these maps seem to be used by water managers due to their high costs.

Path dependency in terms of top-down management traditions is also apparent in the Kyrgyz bureaucracy's tendency towards 'micro-management'. This goes hand in hand with a lack of strategic vision often criticized by international donors, and it can be seen as a result of the weak policy-making competencies among the ministries. In contrast, the presidential administration, which acts in parallel to the line ministries, is of major importance for decision-making. The fact that even minor decisions are apparently taken by the presidential administration is in clear contradiction to the principle of subsidiarity. At the same time, the ministries, for their part, also tend to interfere in the everyday work of lower administrative levels.

The description of the division of labor at national level has made clear that the principle of subsidiarity is regularly breached. Competencies are fragmented and organizations are at the same time powerless and keen to control everything. This mixture constitutes a considerable obstacle to the realization of a demanding new concept like IWRM. The fact that no fewer than seven state bodies are responsible for the management of drinking water wells gives an indication of how high transaction costs are for water users in their interactions with the state administration.

Overlapping responsibilities in combination with regulation-free spaces are a clear sign for a strong organizational nestedness (i. e. highly complicated organizational structures). Not only does this render water management slow and costly, it also makes it difficult for organizations to adapt to new ideas. Under such circumstances, the institutional setup is itself becoming more and more a reason for change.

Yet at the national level there is a clearly visible political will to reorganize water management according to IWRM principles. This is first and foremost manifest in the recent adoption of the new Water Code, which brings about two major changes in the organizational landscape:

First, the Code aims at unifying regulatory competencies in one new body, namely the State Water Administration. This new body will be the quasi-successor of the DWM, which has more executive functions and compe-

tencies at present. The fact that the new State Water Administration will be institutionally independent of the agriculture-dominated MAWMPI will also prepare the ground for an improved inter-sectoral integration of water management. However, doubts remain concerning the effectiveness of the new State Water Administration: Due to the resistance of other ministries, both monitoring capacities and considerable competencies with regard to policy formulation and advice to the different levels of the water administration will in fact remain within these competing ministries. This brings about the risk of a de facto separation between policy formulation and execution.

Second, the new Water Code provides the basis for the introduction of National and Basin Water Councils. Their potential for inter-sectoral integration on the one hand and the realization of the basin approach on the other have already been mentioned in previous chapters (cf. 4.2.1). The question of whether and how Water Councils will be able to contribute to the realization of IWRM beyond these aspects is still open.

Oblast level

In assessing the role of the *OblVodKhozes,* two points have to be highlighted: First, and most importantly, their competencies remain vague. One interviewee stated that: *"the oblast level of water administration plays no role – only administration with no real functions."* Second, their relation to the DWM is strictly hierarchical. It seems that their work is dominated by reporting-back mechanisms, with a strong tendency to focus on good news – a tendency that donor representatives explain with reference to persisting Soviet legacies.

While located at the top of the information chain on water needs and available water quantities, their current functions within the institutional setting can at best be described as supervising lower levels of water administration and reporting to the uppermost one. The nevertheless existing potential of the *OblVodKhozes* for implementation of IWRM results mainly from the fact that they are already working more or less in accordance with hydrological boundaries (cf. 3.1).[25]

25 It is not clear, whether the recently announced abolition of the *oblast* level will have implications for the future of *OblVodKhozes* since they have already been renamed and reshaped into *basin* administrations in accordance with the new Water Code.

The WSUs within the *OblVodKhozes* are of particular relevance for the decentralization of water management. These special units, which have identical counterparts in each *RayVodKhoz*, assist interested farmers in founding WUAs and provide training to WUA management and executive bodies. The fact that they are currently financed at a rate of 40 % by the World Bank gives them advantages over other departments within the *OblVodKhoz*. The WSUs at *oblast* level carry out training for three WUAs each year, reportedly choosing WUAs from remote areas where the *rayon* WSUs have not yet provided any training.[26]

Yet it is not clear what the comparative advantages of the *oblast* WSUs are in comparison to those at *rayon* level. One employee described the tasks of his organization as follows: "*Our tasks are mainly the monitoring of the rayon WSUs and the regulation of the work of rayon WSUs. Actually we do the same work as the rayon WSUs."* This quotation underlines the difficult position of the *OblVodKhozes* – between carrying out regulatory and executive functions.

Rayon level

The relationship between the *RayVodKhozes* and upper levels of the water administration brings to mind a principal-agent constellation. While theoretically integrated within a strong hierarchy, with the *OblVodKhozes* as controlling body, *RayVodKhozes* have considerable room for maneuver: As in practice supervision by the *OblVodKhozes* is rather lax, *RayVodKhozes* do in fact lack real control from above. This in turn gives their staff the opportunity to satisfy particularist interests. At the same time, most money is spent at *rayon* level: Not only do the *RayVodKhozes* receive budget transfers from the central government, they also receive ISF from water users. Given weak monitoring, it is not astonishing that the *RayVodKhozes'* budget transparency was frequently mentioned as a major problem of Kyrgyz water management.

Taking a closer look at the relationship between *RayVodKhozes* and local level water management organizations, we find that water users' lack of confidence in, and even their distrust of, the work of the *RayVodKhozes*

26 The *oblast* WSUs provide training on nine different topics, including technical equipment and infrastructure, engineering, water usage, administration, financial management, accounting, and conflict resolution.

appear to be the most striking features. The negative attitude of local level stakeholders towards the *RayVodKhozes* can be traced back mainly to three factors:

First, the *RayVodKhozes* still hold control over strategic pieces of irrigation infrastructure. Yet in the perception of many WUA managers and water users, WUAs carry out the lion's share of the maintenance and rehabilitation work. Having taken over numerous tasks previously performed by *RayVodKhozes*, WUAs in fact make the latter obsolete: "*The Ray VodKhozes date back from Soviet times and after independence this network of institutions stayed the same while [tertiary] infrastructure was turned over to WUAs. The RayVodKhozes are still in place with fewer tasks to fulfill. Farmers think that there should be only one organization: WUAs or RayVodKhozes."*

Second, retention of the ownership of parts of the irrigation infrastructure allows the *RayVodKhozes* to demand ISF. However, this is in many cases considered unfair by water users, who frequently criticize the fact "*that they have to pay the fee of 3 tyiyn although they might just use one kilometer of rayon canals."* Lack of budget transparency adds to this problem. Doubts as to whether the ISF are really used for the maintenance and rehabilitation of irrigation infrastructure are common.

Third, being de facto in a subordinate position, WUAs often lack the necessary enforcement power to push the *RayVodKhozes* to fulfill their duties. In one case, for example, according to its contractual obligations, the *RayVodKhoz* would have had to pay compensation for lost yields, as it was unable to supply the amount of water the WUA had applied for. Yet the *RayVodKhoz* simply refused to pay.

Conflicting interests between *RayVodKhozes* and WUAs constitute a major problem facing Kyrgyz water management. From an outside perspective, WUA federations are key for resolving this situation. Federating WUAs able to manage entire canals on their own and – at the same time – dissolving *RayVodKhozes* would constitute an important shift towards the realization of IWRM for two reasons: WUA federations would bring the implementation of the principle of hydrological boundaries forward (cf. 3.1.1), and federations would foster self-management at higher levels of the water administration.

While international donors are actively pushing for the formation of WUA federations, their introduction faces several major obstacles. First, the government seems to be rather reluctant to decentralize and privatize a further level of water governance that is still dominated by the state administration. This is well illustrated in a recent directive issued by the DWM, which instructed the only currently existing WUA federation on how its charter should be formulated. The DWM's model of a federation is limited to a consultative body acting in collaboration with the *Ray VodKhozes*. It is obvious that merely assigning a consultative role to WUA federations would result in a duplication of functions at *rayon* level. The government's reluctant position is further manifest in the absence of provisions on WUA federations in the new Water Code. Despite its overall progressiveness, the Code does not deal with this issue at all. It is rather unlikely that an amendment to the new Code will be drafted in the near future.

Second, the ambiguous attitude of the *RayVodKhozes* towards WUA federations adds to these problems, and at the same time it helps explain the central government's position. Of course – strongly supported by international donors, such as the World Bank – the WSUs at *rayon* level are actively pushing for the formation of WUA federations. However, other departments within the *RayVodKhozes* do not share this positive perception, as federations would make the *RayVodKhozes* obsolete. Abolition of the *RayVodKhozes* would constitute a considerable threat to many of its employees. While a transfer of personnel to newly created federations will be necessary, it is in any case not a realistic perspective for all of the *RayVodKhoz* staff.

Third, the weak performance of many WUAs, which will be outlined below, is a further impediment to the formation of WUA federations. Given their financial constraints and organizational weaknesses, it is of paramount importance to strengthen existing WUAs prior to the formation of WUA federations. In addition, open questions concerning the enforcement power of WUA federations will have to be resolved in the future, e. g. the basis on which WUA federations should manage conflicts between member WUAs.

New organizations which apparently face less resistance from the state administration include the Irrigation and Drainage Commissions at national, basin, and local level. The new Water Code provides the legal basis

for their introduction. If we take a closer look at local level Irrigation and Drainage Commissions (which mainly comprise representatives of irrigation water users), it becomes clear why their introduction did not face the same resistance as WUA federations: Having monitoring and advising functions (Kyrgyz Republic 2005, Art. 79), they merely act as consultative bodies to the *RayVodKhozes*, and thus do not constitute a real threat to the latter.

Water User Associations (WUAs)

Aiming to overcome highly centralized Soviet water management, the Kyrgyz government has undertaken an important step towards decentralizing water management by promoting WUAs. Significant efforts have been made to transfer not only irrigation infrastructure but also competencies and decision-making power to the local level.

Although the existence of WUAs might already be taken as evidence that management structures have been reorganized according to the principle of subsidiarity, it has nevertheless to be questioned whether WUAs are currently in a position to carry out the management tasks assigned to them.

At first sight, in comparison to other Central Asian countries, Kyrgyzstan is quite advanced regarding the level of WUA development, i. e. both in terms of WUA legislation and the transfer of irrigation infrastructure.

Despite initial problems, many WUAs have demonstrated significant learning ability: By drafting water use plans and distributing water to end users, they have step by step taken over tasks previously carried out by the *RayVodKhozes*, which in many areas did not work properly shortly after independence.

Most importantly, WUAs have enhanced the overall efficiency of Kyrgyz water management. Confronted with a rapidly increasing number of water users following land reform, the *RayVodKhozes* were overburdened by the tasks assigned to them. With the *RayVodKhozes* no longer having to deal with individual water applications, the work of privatized WUAs has significantly contributed to the reduction of the transaction costs of the Kyrgyz water administration. Efficiency of local water management is further enhanced by current WSU initiatives to promote the amalgamation of WUAs sharing one canal. In terms of economies of scale, this step prepares the ground for a more rational and effective organization of WUAs,

as it goes hand in hand with staff reduction and reportedly also with the transfer of *RayVodKhoz* equipment.

It is thus not surprising that several interviewees agreed that "*WUAs are the only way to manage on-farm irrigation systems in Kyrgyzstan"* – a statement which clearly demonstrates the general acceptance of decentralizing water management among the water administration and experts in the field of irrigation. By promoting greater security of water provision, WUAs also have good chances of increasingly gaining acceptance among irrigation farmers.

However, notwithstanding the potential that Kyrgyz WUAs undoubtedly have, experts frequently criticize their poor performance and the fact that many WUAs only exist on paper (Chemonics International 2003, 29). Before discussing the constraints WUAs face in more detail, it is worth briefly recalling two central objectives usually underlying the transfer of irrigation management. The aim is first and above all to establish financially self-reliant water service providers responsible for the operation, maintenance, and rehabilitation of the system, which can gradually replace the public agency in the management of irrigation systems; a second aim is to enhance the transparency and accountability of water management (Vermillon / Sagardoy 1999, 19). Yet suffering as they do from financial constraints, many WUAs are at risk of failing to perform their tasks in a satisfactory way. At the same time, organizational weaknesses are undermining the aim of increasing the transparency and accountability of local water management.

As outlined in 4.2.2, the reasons for financial constraints facing WUAs must mainly be sought in two factors: the low level of WUA fees, which does not adequately reflect the financial needs of the associations, and the low willingness of water users to pay fees. Although collection rates have improved during the last years, many WUAs are still indebted with the *RayVodKhozes*.

Lack of financial resources impair the WUAs' capacity to perform their tasks in the following fields: First, lacking the necessary equipment (transport, communication, data processing, excavation equipment etc.), WUAs are often unable to adequately operate, maintain, and rehabilitate the irrigation systems transferred to them (DFID 2003, 3–5, 10–9 f.; Ul Hassan / Starkloff / Nizamedinkhodjaeva 2004, 30). Second, their weak financial

basis also negatively impacts the WUAs' ability to take over all relevant infrastructure. If drainage infrastructure is in many cases still in the hands of the *RayVodKhozes*, it is not because the latter are reluctant to transfer it, but rather because many WUAs are financially not in a position to maintain the drains within their service areas. Third, with salaries generally low, WUA management has difficulties in hiring qualified staff. As a consequence, WUA staff often lacks the necessary know-how. Sometimes, far from being irrigation specialists, it is to be questioned whether WUA staff are able to adequately fulfill their duties, such as drafting plans on budgets, water use, and operation and maintenance. While WSUs, donors, and NGOs aim at bridging this knowledge gap by providing training, frequent staff rotation resulting from low salaries often undermines the sustainability of these efforts.

Organizational weaknesses seem to be most widespread in remote areas, which have been rather neglected with regard to training and capacity building. Nevertheless, even WUAs in Chui, the *"backyard of the capital,"* and in Osh, one of the most popular regions for pilot projects, suffer from weak organizational structures.

Lack of monitoring mechanisms turns out be the most important deficit. Insufficient control not only negatively affects the accountability of WUA management and executive bodies but also contributes to the overall poor performance of many associations. In combination with the low level of salaries, it also prepares the ground for moral hazard and corruption of WUA staff, manifest, *inter alia*, in the misappropriation of money and staff vulnerability to bribery (Ul Hassan / Starkloff / Nizamedinkhodjaeva 2004, 33 f.; DFID 2003, 10–6). This in turn brings about the risk of a loss of water user confidence in the WUAs' work (cf. Figure 9).

In poorly performing WUAs, the WUA Council, which ideally coordinates the association's activities and controls the work of the executive organs, is often nonexistent or works poorly. In some associations, there is only a head of Council. This is due to a lack of economic incentives, as Council members work on a voluntary basis. In addition, the Audit Commissions, which should monitor the WUAs' financial activities, are often not yet integrated into the institutional setup of WUAs. However, efforts are currently being undertaken by the WSUs to strengthen the role of the Councils and to establish Audit Commissions.

As regards the work of *mirabs*, principal-agent constellations not only promote moral hazard, rent seeking, and/or favoritism, they also often render water allocation arbitrary and inefficient. Yet some WUAs have addressed these problems, i. e. by urging water users to demand receipts for each amount paid to *mirabs* or by introducing a system of *mirab* rotation.

Other stakeholders at local level

Apart from WUAs, several other organizations, which are not primarily involved in water management issues, engage in this field at the local level. The interference of these stakeholders in the WUAs' sphere of responsibility has to be understood as a consequence of the above-described financial constraints and organizational weaknesses faced by many WUAs. The *ayil okmotus*, *ayil bashis,* and *aksakal sotus* lack the legal basis to carry out tasks that, ideally, should be in the hands of WUAs.

At municipal level, the *ayil okmotus* have a strong stake in water management. Providing support and assistance to WUAs in a number of different fields, their activities include the following: monitoring the reliability of water provision, assistance in water allocation, conflict management, provision of equipment, assistance in application procedures for grants, and credits and support in coping with debts with the *RayVodKhozes* (e. g. by making ALRF land available to WUAs). In addition, the *ayil okmotus* actively support WUA creation.

Given the financial constraints the *ayil okmotus* are themselves facing, the question arises, what motivations are underlying their commitment to support and assist WUAs. Three aspects are worth mentioning: First, the *ayil okmotus* act as guarantor for credits given to WUAs within the framework of the World Bank financed On-farm Irrigation Project and have thus understandably a interest in properly performing WUAs. Second, agriculture is by far the most important source of income of the rural population and thus crucial for the tax generation of the *ayil okmotus*. Third, facing financial and administrative burdens, the *ayil okmotus* – to which irrigation infrastructure was transferred prior to the creation of WUAs – are fairly keen on ridding themselves responsibility by pushing WUA formation.

As recently created or poorly performing WUAs which do not yet meet the criteria defined by the World Bank most often lack financial support and capacity building, the assistance offered by the *ayil okmotus* is clearly positive. However, the fact that the latter in some cases take over tasks assigned to WUAs could lead to an overlap of responsibilities, which in the long term entails the risk of negatively impacting the effectiveness of local water management in general and of WUAs in particular.

At village level, the *ayil bashis* and *aksakal sotus* are the most important stakeholders in water management. While rather insignificant in the northern part of the country, the *ayil bashis* play an active role in the work of southern WUAs. Their tasks range from the collection of fees to assistance in drafting water use plans and informing villagers on the work of WUAs as well as on decisions taken in WUA general assemblies. *Aksakal sotus* mostly emerge as relevant stakeholders when it comes to the settlement of conflicts which many WUAs are unable to deal with given the absence of functioning conflict management bodies (cf. 4.3.4).

As to the motivation of the *ayil bashis* and *aksakal sotus*, behavioral factors seem to be a driving force: The rationale underlying their engagement in local water management is to increase social capital "*by making own actions visible to other people in the village*".

On the one hand, *ayil bashis* and *aksakal sotus* can draw on their social capital to either mobilize and inform farmers on WUA meetings or to enforce WUA rules and regulations, thereby contributing to the reduction of transaction costs of water users. On the other hand, their interference in the WUAs' sphere of responsibility bears the risk of weakening existing bodies and hindering the introduction of new bodies.

Possible Improvements / Recommendations

— Recommendation to the Kyrgyz government and donors: **Promote the creation of WUA federations.**

  As outlined above, among the major problems facing Kyrgyz water management are the conflicting interests between *RayVodKhozes* and WUAs. WUA federations are key for resolving this situation. Aiming at promoting self-management at higher levels of the water administration and avoiding duplication of functions, their introduction should be strongly supported. Taking into account that the new Water

Code does not include any provisions on WUA federations, consideration should be given to amending it.

— Recommendation to the Kyrgyz government and donors: **Create perspectives for *RayVodKhoz* staff.**

As the establishment of WUA federations will make the *Ray VodKhozes* obsolete in the long run, both the government and international donors should open up new perspectives for *RayVodKhoz* staff. Some staff should be prepared to take over management tasks in WUAs and WUA federations. Nevertheless, the work currently performed by the WSUs at *rayon* level is vital for the functioning of local water management organizations. *Rayon* WSUs should therefore not be closed but upgraded by integrating them into the *OblVodKhozes*. Local branches at *rayon* level should nevertheless be maintained, in order to enhance their responsiveness to the needs of WUAs and newly created federations.

— Recommendation to WUAs: **Increase WUA fees** (cf. 3.3.1).

With the aim of improving the financial basis of WUAs, WUA Councils should work for an increase of WUA fees. Higher fees would both allow WUAs to carry out operation, maintenance, and rehabilitation work more efficiently and enable them to provide the economic incentives needed to hire qualified staff, thereby avoiding staff rotation.

— Recommendation to donors and WSUs: **Widen the scope of trainings on technical issues and infrastructure.**

In order to compensate the low level of know-how among WUA staff, continuous capacity building is of paramount importance. Consideration should therefore be given to widening the scope of already existing trainings on technical issues and infrastructure for WUA management and executive bodies. Given frequent staff rotation, it should be ensured that trainings are provided on a regular basis.

— Recommendation to the Kyrgyz government, donors and WSUs: **Carry out organizational development measures.**

As many WUAs suffer from organizational weaknesses, there is a need to carry out organizational development measures to render WUAs more efficient and to avoid any interference of other stakeholders in the WUAs' sphere of responsibilities. Efforts should particularly be undertaken in the following fields:

— **Strengthen and promote monitoring mechanisms**. To improve the monitoring of the WUAs' overall activities and the work of executive bodies, it is essential to further strengthen the presently rather weak role played by the WUA Council and to promote the integration of Audit Commissions into the institutional setup of WUAs. Current efforts of the WSUs in this regard should be strongly supported. Regarding the work of *mirabs*, the introduction of control mechanisms should be promoted. Best practices should be replicated; these would include e. g. handing out money for fees only against receipts as a means of preventing misappropriation and rent seeking as well as regular rotation of *mirabs* to avoid favoritism in water allocation.

— **Widen the scope of trainings on managerial issues**. Given the rather low level of know-how on the part of both WUA management and staff, the present study recommends widening the scope of trainings on managerial issues for WUA management and its executive bodies. Best practices could, *inter alia*, be drawn from a joint project carried out by the GTZ and RDC-Elet in the Batken *Oblast*, which aimed at improving data collection and processing on the needs of different water users within the WUA service area and at rendering budget management more transparent to water users.

5.1.2 Bottom-up approaches to water management

With the active promotion of WUAs, the Kyrgyz government has undertaken an important step towards enhancing the participation of water users in local water management. Aiming at enforcing the principle of participation, the right of water users to participate in the management of water resources was enshrined in the 2002 Law on WUAs.

In addition, the recently adopted new Water Code has significant potential to further foster water user participation. Its relevance can be inferred from the fact that it provides the legal basis for both Irrigation and Drainage Commissions comprising representatives of irrigation water users, and Basin Councils in which all relevant stakeholders, including WUA delegates, will be represented (Kyrgyz Republic 2005, Art. 10; Art. 79). The new Water Code thus promotes participation even above the local level.

However, with water users often not sufficiently involved in management decisions in practice, many WUAs are at risk of being mere 'water supply organizations' rather than real 'water user associations.' Yet the idea underlying the IWRM principle of participation is to bring water management nearer to users. The following subchapters thus deal with the question of whether Kyrgyz WUAs currently meet this aim. The analyses will focus on three issues: first, water users' attitudes towards WUAs, second, their willingness to participate, third, the role of information for water users' participation, and fourth, their factual influence on decision-making.

Water users' attitudes towards WUAs

Aiming at explaining farmers' willingness or lack of willingness to get organized in WUAs, interestingly, indicators for both path dependency and mind change were found. The north of the country tends to be more strongly influenced by Soviet legacies (path dependency). There is a general lack of understanding among farmers of why the state no longer cares for the rehabilitation of infrastructure and why it no longer provides water for free. Under such circumstances, the easiest way to push forward the formation of WUAs is to adopt a top-down approach. Indeed, WUA creation was promoted more by external actors (such as *ayil okmotus*, *RayVodKhozes*, WSUs and donors) and/or individuals wishing to access external funds than by water users themselves. The question is thus how meaningful participation of water users can be realized in regions where farmers have not been and are not interested in getting organized in WUAs.

Still, mind change is already taking place among the rural population. Several interviewees agreed on the fact that "*at the beginning, the introduction of WUAs was a top down process. But now farmers begin to understand the sense of WUAs."* Seeking to explain this process of mind change, the present study identified three main factors: First, social mobilization efforts have been undertaken, first and foremost by WSUs at different levels of water administration as well as by donors and NGOs; their aim should be to sensitize farmers to the advantages of smoothly functioning WUAs. Yet given the top-down approach adopted in Soviet times, continuous social mobilization is key to achieving bottom-up forms of water management. Second, confronted with an institutional vacuum at the local level following the collapse of the Soviet Union, farmers are

becoming aware that the government will not take back the responsibility for secondary and tertiary irrigation systems. In this vacuum, water management has in many cases been organized from the bottom. Informal WUAs initiated by the farmers themselves were often created shortly after independence, in remote areas or in areas where people were discontent with water provision by the *RayVodKhozes*. Third, mind change is closely linked to positive experience made with the work of WUAs, e. g. with regard to rehabilitation measures, technical developments of irrigation infrastructure, and overall improvements regarding water provision. While the ability of WUAs to meet water users' needs is essential for the acceptance of WUAs, bad performance due to financial constraints and organizational weaknesses puts many WUAs at risk of loosing water user support.

Besides these rather psychological factors which constitute normal problems facing countries in democratic transition, farmers' willingness to get organized in WUAs depends on three 'hard factors': the availability of water resources, the state of irrigation infrastructure, and the complexity of irrigation infrastructure.

Water users are more likely to support WUA formation in those regions where they face water scarcity. In contrast, in areas with abundant water supply (such as in mountainous regions) water users often do not see any need for WUAs. The mere prospect of being able to participate in decision-making on water management is not sufficiently attractive to farmers. Often, economic considerations add to farmers' reluctance to support the creation of WUAs, since they fear that fees will rise.

The deterioration of irrigation infrastructure is clearly a driving force for WUA creation, last but not least because WUAs are a prerequisite for access to external funds. This is well illustrated by the quite typical statement of a WUA director in the Chui *Oblast*: "*Maybe our territory would need no WUA, but we have heard about grants given by the ADB for rehabilitating the canals. For receiving such grants the creation of a WUA is necessary."* Economic incentives thus act as a central motivation for establishing WUAs (Wegerich 2000, 12). Yet this overemphasis on economic incentives and technical developments in the process of WUA formation reinforces the impression that WUAs are perceived more as supply organizations than real water user associations. In addition, the

question is what is going to happen when donor projects are phased out and external funds are no longer available.

In areas with complex irrigation networks, people are more likely to support WUA creation, whereas in areas with less sophisticated networks farmers may maintain the canals by themselves. Thus economies of scale influence positively the acceptance of WUAs among the rural population.

When WUA formation from the bottom is supported in areas with water scarcity, deteriorated infrastructure, and complex irrigation networks, this means a very difficult starting position for such WUAs. This constellation on the one hand adds to water users´ expectations for WUA performance and on the other hand at the same time increases the risk that these expectations will not be met. This in turn may lead to reluctance to accept this new form of water management.

Water users' willingness to participate

With underdeveloped markets and lack of access to agricultural inputs constituting the main obstacles to agricultural production, irrigation is often not a priority issue for farmers. Understandably, their interest in the work of WUAs is thus sometimes limited, especially in areas with abundant water supply (Ul Hassan / Starkloff / Nizamedinkhodjaeva 2004, 34; Wegerich 2000, 12f.).

Consequently, water scarcity, not only in geographical but also in seasonal terms, appears to be the driving force for the degree of activity of WUA members. Quite a few interviewees pointed out that farmers' willingness to participate tends to be limited to those months of the year where the need for water and – consequently – also problems with water delivery are most acute. According to one WUA development specialist, lacking experience with bottom up approaches to water management, farmers tend to look at participation only from a short-term perspective: "*The problem is that when there is no water, farmers run to get it, but when they have enough water they forget about everything connected to water management."*

In terms of water users' participation, WUAs are more advanced in the more water-scarce south (particularly in Osh and Jalalabad *Oblasts*). With a view to explaining these regional differences in further depth, two additional push factors were identified: First, the speed and the scope of land

reform was more far-reaching in the south. Due to private land ownership, farmers in the south have developed stronger feelings of ownership for their land. Second, and most importantly, land scarcity is more acute in the south. Both factors significantly enhance farmers' interest not only in having functioning WUAs on which they depend for production but also in participating in WUA decision-making. A study carried out by the TES Center in Osh *Oblast* even reveals that farmers are interested in having more participatory forms of WUA organization (TES 2005, 13–2).

However, strong tendencies towards top-down leadership were found, and these impede the involvement of users in the management of water resources. "*The former formal rules of top-down approaches have shifted to informal arrangements, which are stronger than the new formal rules in place*" (Wegerich 2002, 28). Two features of WUA leadership are typical in the Kyrgyz context: First, many WUA directors and Council members previously had leading positions in former *kolkhozes*, e. g. as hydro-technicians. This seems to be even more often the case in the north of the country. Following the break-up of *kolkhozes*, these old elites managed to retain influential positions – due both to their know-how and their personal networks. Second, farmers often prefer to delegate responsibilities to their leaders (Wegerich 2000, 12f.). This becomes apparent in the following statement of a WUA director in Chui *Oblast*: *"But people have not yet changed their mind and decided to rule on their own. My position is completely autocratic. I think we need a strong hand and a strong will."*

Several interviewees working in WUA development expressed resignation about Kyrgyz farmers' passiveness and unwillingness to become more active in WUAs. Consequently, the success of a WUA depends first and foremost on its leaders. Given farmers' reluctance to participate, top-down leadership should not automatically be considered as negative, as strong leaders or personalities also have the potential to motivate members and to push forward the work of the association. However, autocratic leadership entails the risk of moral hazard. Most importantly, there is a question as to the degree to which autocratic leaders really represent the interests of water users.

The role of information for water user participation

While it is obvious that information for water users is a central prerequisite for participation, marked deficits have been identified in this regard.

Knowledge about the existence and functioning of WUAs seems to be slightly stronger in the north, most probably because the WUA service areas there are generally smaller. In southern WUAs, farmers often do not even know about the existence of their WUA – sometimes even though they are listed as WUA members. There is a clear information deficit among farmers with regard to the functioning and setup of WUAs, e. g. the possibility to become active in GAs.

While interest in functioning WUAs is higher in the south of the country, the large size of WUAs in this part of the country (in terms of both members and service areas) makes information transfer to water users difficult. The *mirabs* who interact face-to-face with water users play an important role in informing people on WUA activities, meetings and decisions. Furthermore, the *ayil bashis* are important stakeholders as they arrange village meetings during which water users are informed about WUA activities. In other words, as information transfer is rather informal, very much depends on commitment of individuals.

There is a lack of information not only on WUAs but also on water users' rights and obligations as well as on new legal developments relevant to local water management, e. g. the future role of Basin Councils as well as Irrigation and Drainage Commissions. Given the Water Codes' relevance for enhancing water users' influence in decision-making bearing on water resources management, informing water users appears to be crucial for translating its potential into reality.

Water users' involvement in decision-making

A functioning general assembly (GA) has the potential to bring water management nearer to the needs of water users, as it allows for their participation in decision-making. In addition, the GA serves as an important information platform, as staff reports on the WUA's activities, thereby both enhancing water users' ability to take adequate decisions and top-down accountability.

The findings regarding the influence water users have on decision-making were mainly positive. During the GA meetings, annual budgets and work plans are usually discussed and approved, decisions on sanctions and *ashars* are taken, and WUA Council members are elected. Quite surprisingly, the water users themselves also sometimes elect directors and other

staff – a task which is normally assigned to the members of the WUA Council and the directors, respectively. In cases of bad performance, the GA is also used by members to dismiss WUA staff.

Again, WUAs in the south seem to be better developed in terms of functioning GAs. In order to address the problem of the high number of members, a system of representatives has been introduced in southern WUAs. The water users usually elect these representatives during village meetings. They table proposals for GA meetings, communicate the needs of water users, take decisions on future activities of the association, and appoint or dismiss WUA staff. During village meetings, water users are then informed about decisions taken in the GA. These representatives in fact quite actively use the GA as a discussion and decision-making platform.

Despite this rather positive picture, some weaknesses were identified, which will now briefly be outlined. The organizational weaknesses encountered included poorly functioning and in some rare cases even non-existent GAs. Sometimes meetings were not formalized, took place only on a irregular basis, or members did not have a real voice in decision-making.

Another factor that hinders the participation of all water users in decision-making is that *aksakals* (elders) traditionally play a strong role in Kyrgyz society. This is particularly true for rural Kyrgyzstan. This tendency seems to be slightly more marked in the south, where most of the above-mentioned WUA representatives are *aksakals*. Although entailing a risk of undermining democratic principles, this cultural pattern should not be considered as too negative, as *aksakals* can draw on their social capital in order to enforce WUA rules or to mobilize people. It is nevertheless important to bear this specific feature of rural Kyrgyz society in mind in carrying out trainings and social mobilization measures.

While quite successful, one weakness of the southern system of representation has nevertheless to be highlighted: At present, very much depends on the willingness of individual representatives to report back to the villagers and inform them about decisions taken in GAs. Thus information transfer to water users is not always ensured. At present it is either the *ayil bashis* or the *mirabs* who inform villagers about WUAs activities – as the latter do interact face-to-face and (during irrigation periods) on a daily basis with water users.

Possible improvements / Recommendations

— Recommendation to donors and the Kyrgyz government: **Further strengthen and support WSUs.**

  As regards the support provided to WUAs, an overall positive picture was gained of the work done by the WSUs at the different levels of administration. We would therefore recommend that WSUs be further strengthened and supported with the aim of enabling them to widen their activities, i. e. to develop and provide more training and to cover larger areas, including remote and underserved areas.

— Recommendation to WSUs, donors and NGOs: **Target water users through trainings**:

  At present, there is a clear tendency to focus trainings on WUA staff, with water users usually not receiving sufficient training. In order to enhance water users' ability to actively participate in local water management, we suggest that specific trainings for water users be developed in the following fields:

  — **Provide information to water users**. Taking into account current information deficits among water users, trainings should be provided on the aims and functioning of WUAs, water users' rights, and obligations and implications of the new Water Code for local water management. In addition, consideration could be given to using local radio stations, newspapers, and agricultural extension services to disseminate information.

  — **Strengthen WUA general assemblies**. Given the potential of GAs to enhance water users' participation in decision-making and to turn WUAs into real associations of water users, a special focus should be placed on organizational development measures aimed at strengthening the role of GAs. Trainings should deal with issues such as the functioning of GAs, correct voting procedures, frequency of meetings, reporting mechanisms within the GA, and the rights of members.

— Recommendation to donors and the Kyrgyz government: **Widen WUA activities wherever feasible.**

  Access to agricultural inputs often constitutes a more pressing problem to farmers than irrigation. In order to enhance the acceptance of WUAs among water users, consideration should be given to widening WUA activities wherever feasible. Using economies of scale, activi-

ties could include bulk purchasing of fertilizers, pesticides, and seeds, but also provision of agricultural machinery.

5.2 Information and communication

The availability of information and communication of it between different levels of the water administration and especially between water users and water managers is a prerequisite for integrated water resources management. Decisions have to be taken under consideration of the water needs of different users, and at the same time water users must be able to rely on water quotas they have applied for.

5.2.1 Information on individual water use

Information on individual water use is an essential precondition for increasing efficiency in water use. Only if individual consumption is measured and controlled can destructive behavior like water theft be prosecuted. At the same time, this would permit water managers to better plan water allocation to all users and to reward water saving.

There is accurate measurement of water only at the higher levels of the water supply network. Measurement is mainly carried out by the *RayVodKhozes* for all primary canals and most secondary canals. Water is generally also measured when it is delivered to WUAs. Below this level, exact measuring of quantities is rare. Some WUAs or large collective farms have their own measurement devices, but individual farmers usually cannot determine their water use precisely. At this level, *mirabs* control water distribution, sometimes by eye, sometimes with the help of simple portable measuring gadgets. The reliability of these methods is a matter of dispute. In any case, these methods are subjective in nature and can thus easily be contested by water users.

A common problem in Kyrgyzstan is the deterioration of existing measuring devices, as the whole of infrastructure is in the midst of a general process of decay. Today, many measurement facilities from Soviet times are out of order. Cases involving unlined earthen canals render precise water measurement additionally difficult, since great losses occur before the water reaches the fields.

Given that exact measurement at the farm or field level is largely inexistent, water managers calculate theoretical water use according to crop type and cultivated area. Average water flows in small ditches and frequency of watering turns for different crops are taken into account as a means of coming up with optimal approximations of actual water consumption. As a consequence, farmers mostly know how much they pay for water overall, but they are often unaware of the volumetric quantities they are using. Nevertheless, they make use of their experience to control the water supply. The method of calculating water use via crops and cultivated areas seems to be the most practicable and rational approach, even though it is not absolutely precise. At the moment, it may be seen as a satisfactory way to ensure that water supply continues to function until the financial constraints obstructing more detailed measurement have been overcome.

Yet there are some negative effects involved in the actual situation: Lack of exact measurement does not encourage water-saving behavior and may additionally tempt water users to withdraw more water than allowed, as it is difficult to prove such irregularities. This constitutes a free-rider problem which could be avoided by better control. Of course, effective measurement is also needed, as control mechanisms alone do not guarantee that rules will be observed. As confirmed by several WUA directors, better measurement would mean fewer conflicts.

In general, measurement seems to be perceived as more important nowadays, since water has become a costly resource. Some canal rehabilitation projects, mostly financed by donor organizations, already include new measurement devices even at secondary and tertiary canal level.

Possible improvements / Recommendations

— Recommendation to the DWM, i. e. the future State Water Administration, and donors: **Promote investment in measurement infrastructure.**

  In the context defined by lack of information on individual water use, the main aspects that need to be addressed are technical in nature. There is a need for better and more widespread measurement. For this reason, investment in measurement infrastructure is just as necessary as canal rehabilitation. Measurement at the tertiary canal level or even at every farm gate would be a desirable though at present more or less unrealistic condition. Nevertheless, it should be the long-term

goal of Kyrgyz water managers. The different donor organizations and all levels of Kyrgyz water administration should take the initiative in this field because it is in their interest to achieve greater efficiency in water use. Credits from donors for public investment in measurement infrastructure are a practical proposal in this regard.

5.2.2 Information on needs of all users affected by management decisions

Inclusion of all users' water needs in management decisions means that information about these needs must be available. At present, small-scale users such as cultivators of garden plots are neither surveyed nor considered in decision-making. But not only the availability of information, its consideration by decision makers is also crucial for good water management. Only if all different users' needs are given due consideration will it be possible to arrive at a just distribution of resources according to agreed criteria. The present section therefore takes a look at both the availability of information itself and its influence on management decisions.

Information about water needs of individual water users is taken into account in a bottom-up planning process for water application. Farmers communicate their crops and the areas they wish to cultivate to the WUA or the *RayVodKhoz* before the growing season starts. Then, depending on their capacities, either the WUA or the *RayVodKhoz* calculates water needs for each field and each farmer. This data is aggregated for WUAs, for canals, and further upwards, extending across the water hierarchy, and thus water managers at the different levels (WUA, *rayon*, *oblast*) are familiar with the total water needs of the different subunits and are able to take decisions accordingly. This application system is in principle still the same as it was in Soviet times.

Contrary to this theoretical planning, it was found that in practice the needs of all water users are not always properly reflected by management decisions. The yearly application process serves to assess and coordinate the water supply for the whole irrigation season. It has to take into account the different water needs and the capacities of the different parts of the irrigation network. The process is necessary to provide to everyone the service requested. However, the targets are not always met in reality, as farmers order water during the growing season, whenever they see a need.

Mostly, they tend to apply for more water than they would really need, and water managers do not consistently monitor their requests. Sometimes water allocation only follows the principle of distributing the amounts available and does not really abide by water needs of specific crops or water users. Under such circumstances, it is obvious that the information gathered before the season is not consistently considered by either water managers or water users. There are still strong indications of a supply management approach in Kyrgyz water management.

In recent years, the whole process of water allocation has become far more complicated since there are no more collective state farms and land plots are extremely fragmented. It is thus one of the merits of WUAs that they act as intermediate institutions, collecting and sometimes also coordinating different water needs. In some cases, though, WUA members seem to be reluctant to hand in their applications on time, perhaps because they do not fully understand the need for planning. Other farmers simply lack agricultural know-how concerning their own water needs. Often WUA staff are also not able to calculate water needs with the help of the sophisticated tables dating back to Soviet times, and the *RayVodKhozes* have to fulfill this task. Generally, it does not always seem easy for water managers to get the information they need on all users' water needs. And of course neither farmers nor water managers can predict precipitation and weather conditions, which have a significant impact on irrigation needs. In consequence, it is difficult to precisely determine future water needs.

Possible improvements / Recommendations

— Recommendation to the Kyrgyz government: **Ensure transparency in decision-making and information flows for all water users** (cf. 4.3.4).

  Even though it appears that except for small garden plots most users' water needs are included in the planning process for water allocation, the planning is not always implemented when it comes down to actual practice. It is therefore important that water user needs be properly reflected by water managers' decisions. It should be ensured that information flows are accessible to all water users and water managers at different levels. This could be achieved through measures such as public information boards in villages or WUAs and monthly meetings for filing complaints. These measures could contribute to better communication in both directions. Additionally, control

mechanisms should be introduced in order to secure top-down accountability and transparent decision-making. Possible ways of realizing this would include, for example, regular joint meetings of different administration levels with WUAs and periodic newsletters within the administration as well as for water users.

5.2.3 Reliability of water quotas to be delivered by authorities

Water users need to be sure of water delivery in order to take their entrepreneurial decisions. Therefore, the trustworthiness of water quotas is an important aspect in efficient water management. This fosters investment and helps limit water overuse in that it makes it possible for water users to rely on sufficient and timely supply.

As regards the reliability of individual water provision, many Kyrgyz water users complain about late or insufficient water delivery by authorities. In frequent cases, this seems to have led to losses for farmers. The general decay of irrigation infrastructure contributes to water losses and makes water provision more difficult and less reliable. Water scarcity is another reason for problems concerning the reliability of water supply. In very dry years or months, there appear to be serious problems in some regions. These difficulties tend to be greater in tail-end sections of canals. Generally, this leads to a situation in which water users are unwilling to pay for the water they receive because they are not satisfied with the supply service. This vicious circle has already been described in Figure 8.

In cases of water scarcity, special mechanisms are used to decide on water allocation. Often, water is allocated on a ‘first come first serve’ basis. In other places, needs play a more prominent role: Criteria such as crop water needs or sun and shade conditions in mountainous areas are taken into consideration in coming to decisions on water allocation. A *mirab*, a WUA director, or an *ayil okmotu* representative might then take the final decision. Frequently, these persons take rather informal measures, allocating water to people on a clan or friendship basis, or just on spontaneous demand. All these informal mechanisms decrease the transparency and efficiency of allocation decisions, as the latter are not made according to rational criteria like payment of fees, crop water needs, relative benefits, or others, and are often based on personal preferences and bribery.

As stated above, water distribution within WUAs and between different land plots is often not precisely measured. This impedes the availability of information on actual water quotas and is the basis for conflicts on water provision and quantities delivered. Another problem is that WUAs and individual water users have until now not had long-term rights for water abstraction. Farmers had to rely on yearly contracts with their WUA or the *RayVodKhoz* and could not be sure whether they would receive the same amount of water in the following year. This persistent unreliability is further due to climatic variations, frequent infrastructure breakdowns, and insufficient network storage capacities. It is obvious that this lack of security leads to uncertainty among water users and amounts to a substantial obstacle to investment.

At present, according to contracts between the WUAs and the *RayVodKhoz*, the latter is responsible for supplying a fixed amount of water to certain division points in the irrigation system. The *RayVodKhoz* and the WUA administration sign a receipt for the quantity delivered, and it is measured at this point. If the *RayVodKhoz* cannot supply the request because it lacks sufficient water, the WUAs pay only for the amount they actually receive. As already mentioned, there was until recently no legal basis for compensation for losses induced by late or insufficient water supply. This has changed with the new Water Code, which provides for long-term water supply contracts (15 years) and also establishes that compensation have to be paid if the water supplier is unable to meet the contractual arrangements (Kyrgyz Republic 2005, Art. 34; Art. 39). However, in situations of drought, water shortage, or emergency, water permits can be suspended without compensation. Unfortunately, provisions referring to the point of time of water supply remain unclear in the new Code. This is highly regrettable since irrigation times are crucial for crop growth.

One positive aspect of recent developments is that water users who pay for water are increasingly insisting on timely and adequate provision. This could further contribute to the improvement of the system by putting pressure on water managers.

Possible improvements / Recommendations

— Recommendation to the Kyrgyz government: **Take steps to swiftly implement the new Water Code as well as additional regulations.**

As regards information on reliability of water quotas, the introduction of long-term water supply contracts, as provided for under the new Water Code, is already an important step. The legal provision that water suppliers may be held liable for insufficient supply also points in the right direction. With reference to these aspects, it is highly recommendable that the new Water Code be implemented soon. Nevertheless, further regulations designed to implement the Code should include the time dimension of water supply, as this is absolutely vital for irrigated crops.

5.3 Demand management

Demand management seeks to provide mechanisms that promote water saving and water use efficiency, sometimes based on selection between competing demands. The main points of departure for demand management are investment in water-saving infrastructure and technology or provision of incentives for to encourage water-saving behavior, e. g. volumetric water fees.

5.3.1 Volumetric water fees

Calculating water fees calibrated to actual water use is one of the main principles of IWRM, one aimed at increasing water use efficiency. The introduction of volumetric fees requires measurement of quantities used; its aim is to provide an important economic incentive for users to save water.

In Kyrgyzstan, water is provided against payment. Irrigation service fees (ISF) have been in place in the agricultural sector since 1995, which means that they are not a completely new institution. Willingness to pay for irrigation water is a critical issue for this incentive. There are frequent cases of water users not paying their bills or even cases of water theft, as enforcement continues to be a difficult task for Kyrgyz water mangers. However, according to most experts, the situation has recently been improving.

Water fees in Kyrgyzstan are volumetric in nature because they reflect the principle of quantitative payment. Still, since individual water use cannot be measured precisely in most cases, these are not exact volumetric fees.

Approximation to actual water abstraction based on crops and cultivated area is therefore a viable alternative that at least serves the purpose of stimulating the cultivation of less water-intensive crops, and thus also of saving water. Total water use has decreased in recent years, a development that could at first sight be seen as an initial success of the economic incentive that has been introduced. At the same time, however, the reduction in water consumption has gone hand in hand with a decline in cultivated area from 1,212,200 ha in 2000 to 1,093,900 ha in 2003 (FAOSTAT 2004). There is thus reason to doubt whether the fees have in fact led to more efficient water use.

Generally speaking, water fees are still relatively low, and thus economic benefits are not linked to efficient water use. Big losses in the overall system are detrimental to the goal of water saving by individuals. Water managers are aware of the inefficiencies but complain about a lack of the resources needed to prevent them. To sum up, quasi-economic incentives have been introduced by requiring payment for water use, but they have only begun to produce real change in the minds of water users and water managers. One expert from an international donor organization comments that the actual ISF is a "*rather symbolic, small fee, aiming at making the people used to pay for water.*" The traditional perception of water as a free and God-given good, and the fact that during Soviet times as well water was not paid for, are the main reasons why water pricing is difficult to enforce. As this represents an example of institutional path dependency, it will take some time to achieve any real change in the minds of water users and managers.

Possible improvements / Recommendations

— Recommendation to Kyrgyz government and donors: **Improve measurement of water, especially at the level of water users** (cf. 6.2.1).

  Only by the long term aim to install measurement facilities throughout the system will it be possible to charge real volumetric fees and to monitor the amounts of water delivered, because then supply will be transparent for all concerned. This should have a positive influence on the willingness to pay of water users and put an end to problems concerning the perception of equity in water distribution.

— Recommendation to Kyrgyz government and the Parliament: **Executive authorities should strictly enforce valid regulations and water payments.**

  Enforcement is generally still low in the Kyrgyz water sector. Water theft is common and farmers who do not pay for their irrigation water usually receive water anyway thanks to clan structures and social concerns. Even if the latter may sometimes be desirable from a social point of view, it has to be rejected since it undermines the growing willingness to pay on the part of other water users. Policy-makers and executive authorities should therefore ensure that both the law is and payment of water fees are properly and strictly enforced.

5.3.2 Recognition of different crop water needs

The specific water requirements of different crops are especially important in irrigated agriculture as a means of determining the total water needs of irrigated areas. They consist basically of three dimensions: the water quantity, irrigation time, and number of turns. Of course other aspects such as soil quality, soil humidity, and climatic factors have to be taken into account as well. Acknowledgment and use of crops water needs by water users and water managers is an important indicator for the rational use of water.

As already described, crop water needs are used in Kyrgyz water management for planning the total water requirement of given areas and the respective parts of the irrigation network. The water users communicate their cropping plans to the WUA or the *RayVodKhoz,* and they calculate the individual and aggregated water needs of all users under their jurisdiction. These cropping plans also allow WUAs and administrative bodies (*ayil okmotu*, *RayVodKhoz*) to advise farmers concerning their decisions to cultivate specific crops. They in this way seek solutions in cases in which water scarcity is likely to occur or when the capacity of canals does not permit all riparians to grow the same (water-intensive) crops. Occasionally agronomists working for the *ayil okmotu* or the *RayVodKhoz* also provide advice in such cases concerning the choice of alternative crops or alternative locations, if possible. However, in most WUAs this does not seem to be the rule.

In acute situations of water scarcity, the water requirement of specific crops is also used to determine the sequence of irrigation turns. Water-intensive plants like cotton or sugar beets that are at greatest risk in such situations have priority over more resistant crops such as wheat or sunflowers. Some stakeholders in southern Kyrgyzstan referred to this process as the *avran* method.

One problem concerning the recognition of crop water needs is strong adherence to old irrigation norms that were used in Soviet times. These norms are generally considered to be too high and no longer adequate for the new context defined by small land plots and use of low technology and low-input agricultural techniques. Nevertheless, these norms are frequently used to determine crop water needs and they are therefore a factor contributing to resource waste. Additionally, many Kyrgyz farmers lack agricultural know-how and are therefore not aware of the specific water needs of their crops. Inexperienced farmers tend to think that using more water will raise their yields. Overirrigation seems to be quite common in Kyrgyzstan, sometimes leading to problems with waterlogging and salinization (cf. 3.3). Additionally, the point of time of watering and the amounts used are often simply a matter of experience and not a process based on calculations and measurement. One expert from an international NGO working in the Kyrgyz water sector articulated the crucial point as follows: "*The farmers are poor farmers, they do not know how much water is needed for their crops. They do it the Soviet way. But not everything is rice – it does not have to swim!*"

Usually, crop selection is determined by a farmer's knowledge and experience as well as by market prices. In some cases, crop rotation is also important as a technique for conservation of soil fertility. Yet only in extremely water scarce areas some farmers had shifted their production to less water-consuming crops like sunflower or oil seeds.

Possible improvements / Recommendations

The analysis makes it quite clear that Kyrgyz water users and water managers in principle recognize crop water needs. Unfortunately, this does not generally imply more efficient water use, as other aspects are more important for crop choice and planning still relies on Soviet norms.

— Recommendation to WSUs, agricultural extension services and donors: **Improve water user knowledge and awareness concerning crop water needs.**

  The main recommendation derived from the assessment is that it is water users in particular that should become more aware of specific crop water needs. This could be accomplished on the basis of trainings and information campaigns designed to enable them to assess the water needs of their crops and to use water more rationally. Crop diversification in terms of varying water needs could also serve as a guarantee for many farmers, especially in areas with insecure water supply. Thus crop water needs should be included in farmers' decisions bearing on economic profitability. This can only be achieved if farmers are properly instructed about such issues and if appropriate economic incentives, such as water fees, have been set. Some NGOs are already providing trainings in this respect, but they have not yet reached the majority of water users. There is still a lot of scope for improvement, and the importance of key persons as multipliers has not yet fully been stressed.

— Recommendation to WSUs, scientific institutes, and donors: **Develop new water norms adapted to real crop water needs.**

  A second proposal concerns the old water norms from the Soviet era that are still in use but now seem outdated. New water norms are being developed in pilot projects, e. g. in the Ferghana Valley, and the first results confirm that considerably less water would be needed. However, correct application of these norms calls for sophisticated methods that are not practicable for individual water users. The WSUs should assist WUAs and farmers in trying to adapt the old Soviet norms to new circumstances, based on the results from the pilot projects mentioned. This should be done with the help of academic research institutes and donor support. The Institute for Irrigation in Bishkek has already gathered scientific data on water needs for specific crops and areas that could serve this purpose.

5.3.3 Public initiatives to reduce water losses

Public initiatives are important measures for the goal of providing incentives to save water, because water sector infrastructure is mostly in public hands. Private initiatives could become more and more important in the future if cost recovery of investments is guaranteed. Other measures to

prevent water users from wasting water – such as legal regulations or attempts to raise public awareness for this topic – are just as important. The existence of such initiatives and incentive measures indicates that water management is on its way to a demand oriented approach, as proposed by IWRM.

The question of who is to pay for water losses has still not been resolved in a satisfactory manner. Infrastructure-induced water losses at higher canal levels are exempted from payment and therefore covered by the state. Meanwhile, it is not really clear how losses that occur within the service area of a WUA are covered. Information on this topic differed considerably from case to case. There was one example in Chui *Oblast* where losses were not passed on to farmers, which meant that the WUA had to cover them, and became highly indebted. In some other associations losses were apparently compensated for by additional water provision from the *RayVodKhoz*. Also, one special case, a WUA, was found in Osh O*blast* in which downstream water users were required to pay a lower fee than upstream users because of the large losses that occurred along the way. In spite of these different practices, the general principle of payment by the responsible party seems generally accepted, and this, given adequate water prices, should serve to stimulate efficient water use.

Kyrgyz water managers and water users are well aware of the problems associated with the loss of water. They also understand the urgent need to repair the old infrastructure in order to have access to additional water. Rehabilitation is already the subject of several initiatives to reduce water losses in the Kyrgyz agricultural sector. It has generally a high priority among donor organizations, whose projects in this field are already broadly keyed to the problem (e. g. World Bank, ADB, etc.; cf. Box 11).

Nevertheless, the old mentality from Soviet times, i. e. that the state should care for everything and maintain the overall infrastructure, is still frequently encountered. This example of path dependency is largely responsible for the general lethargy when it comes to changing the current situation. Individual initiatives are rare and appropriate economic incentives for such initiatives are almost nonexistent, induced only by donor-financed projects.

Though people are beginning to understand the value of water, most water users are just now getting used to paying for water, and their only incen-

tive to limit its excessive use is the economic one. One problem is that Kyrgyz farmers generally tend to apply for more water than they really need (estimated: 20–25 % more) in order to make sure that they receive a sufficient amount. This behavior is for their own personal benefit, as water prices do not represent real supply costs, which are covered by the state. As the whole system is highly defective and water losses do not have to be paid for in many cases, there are few incentives for individual water users to help reduce the losses.

Possible improvements / Recommendations

An important step towards increasing water use efficiency is to provide incentives to save water and improve irrigation infrastructure. Possible initiatives to reduce water losses should be pushed mainly by donor organizations and public administration, but ideally WUAs and farmers should also be enabled to invest in water-saving infrastructure. The following recommendations are meant to contribute to finding a solution for the problem:

— Recommendation to Kyrgyz government and donors: **Further rehabilitate and reconstruct deficient irrigation infrastructure and promote water-saving irrigation techniques** (cf. 4.2.2).

— Recommendation to Kyrgyz government and the Parliament: **Increase the level of ISF** (cf. 4.2.2).

6 Conclusion

This final chapter wraps up the study's main findings. Section 6.1 provides an overview of the progress made by Kyrgyz irrigation management towards IWRM, distinguishing between the components of the IWRM Pyramid (cf. Figure 1). Second, concepts from institutional economics will be used to explain observed differences in the pace of reform in order then to identify obstacles to and potentials for further reform steps (6.2). Based on the normative assessment on the one hand and the analytical assessment on the other, the next section will formulate some main recommendations to various stakeholders (6.3). The chapter concludes with an overall resume and outlook (6.4).

6.1 Varying degrees of progress on different components of IWRM

The study's main objective was to assess the extent to which water management in the Kyrgyz agricultural sector is 'on its way towards IWRM.' Summing up the analyses presented in the preceding chapters, it notes unequivocally that Kyrgyz water management is indeed heading towards IWRM. However, having started no more than ten years ago, reforms are just at the beginning of this probably long and stony pathway. The concept of IWRM itself has explicitly informed only the latest steps of reform. Yet the progress made is already considerable, compared to most of Kyrgyzstan's neighbors, and it is likely to continue with the implementation of the ambitious new Water Code, which was adopted by Parliament in December 2004.

Nevertheless, progress varies considerably with regard to the different components of the IWRM Pyramid. There are aspects of Kyrgyz irrigation management that are clearly more 'on track' vis-à-vis IWRM than others, even though it is difficult to rank each of them precisely.

Most progress has been achieved on the managerial principles of IWRM, i. e. regulatory integration. In particular, decentralization of irrigation management has advanced swiftly since the 2002 Law on WUAs and the transfer of most tertiary infrastructure to these bottom-up organizations. The principle of subsidiarity seems to be gaining ground, and merged WUAs – and probably future WUA federations – are expected to take over entire irrigation schemes. This implies the transfer of most competencies from *RayVodKhozes* to end users' organizations, thus rendering the former superfluous in the middle term. Progress on other aspects of regulatory integration is less impressive, but nevertheless notable: As regards information and communication, many infrastructure rehabilitation projects contain components aimed at improving the measurement of water flow and facilitating the calculation of individual water use. Transferring these tasks from the *RayVodKhozes* to WUAs has enhanced the collection and aggregation of data on water needs of end users. The former were overburdened by the task of collecting and processing water applications for each individual land plot that resulted from land reform. Demand management has also improved, thanks to the introduction of volumetric water fees to be paid to *RayVodKhozes* by end users or WUAs. Adapting out-

dated Soviet irrigation norms to current circumstances, though in still a pilot stage, offers some promising perspectives as well. Finally, most donor-financed rehabilitation projects aim at reducing losses due to infrastructure that has fallen into disrepair.

Moderate progress can be observed regarding ecological integration. With WUAs introduced, merged, and – in the future – federated, management structures will be more in line with hydrological boundaries. Once the new Water Code is implemented, the future State Water Administration will be organized at national and basin levels, replacing the current *oblast* structure, which was recently abolished by the new government. It remains unclear, however, whether the *rayon* level of water management will be eliminated. For the moment, the *RayVodKhozes* remain the most problematic organizations for the shift from administrative to hydrological units in management structures. The integration of water quality into irrigation management is far from sufficient. Although pollution standards are rather strict, lack of enforcement is obstructing their translation into practice. Consideration of water-land interaction suffers particularly from the underfunding of drainage facilities and lack of know-how on the part of peasant farmers, who still struggle to manage their privatized plots in a sustainable manner.

Overall, moderate advances have occurred vis-à-vis sectoral integration, although there are considerable differences within this component. The least progress has been made in relation to the internalization of ecological externalities. The new Water Code does lip service to the conservation of nature, but there is no genuine recognition of nature as a legitimate water user in Kyrgyzstan. The picture regarding the integration of social externalities is more ambivalent: While health and gender issues are neglected and local water conflicts are still a considerable problem, the continued subsidization of irrigation services, particularly in remote areas, could be interpreted as a measure against rural poverty. However, this subsidization seems to result more from a general sensitivity toward raising water fees than from any intention to provide targeted support to the poor. Partly due to the subsidization of irrigation water supply, the picture regarding the internalization of economic externalities is ambiguous as well. Although water fees have been introduced and raised several times in recent years, they cover no more than 15 % of real supply costs, a factor that contributes to the severe underfunding of irrigation services. In addition, water-using

activities other than agriculture are clearly underrepresented in the public water administration, preventing reallocation of water resources to other, possibly more profitable uses such as tourism.

6.2 Reasons for varying degrees of progress

In the following sections, the 'subjective model of change' (cf. Figure 3) presented in Chapter 1.2.2 is used to analyze the main problems involved in shifting Kyrgyz irrigation management further towards IWRM. The focus lies on the reasons behind and the process of institutional change itself, as the actual *impact* of ongoing reforms is still difficult to assess.

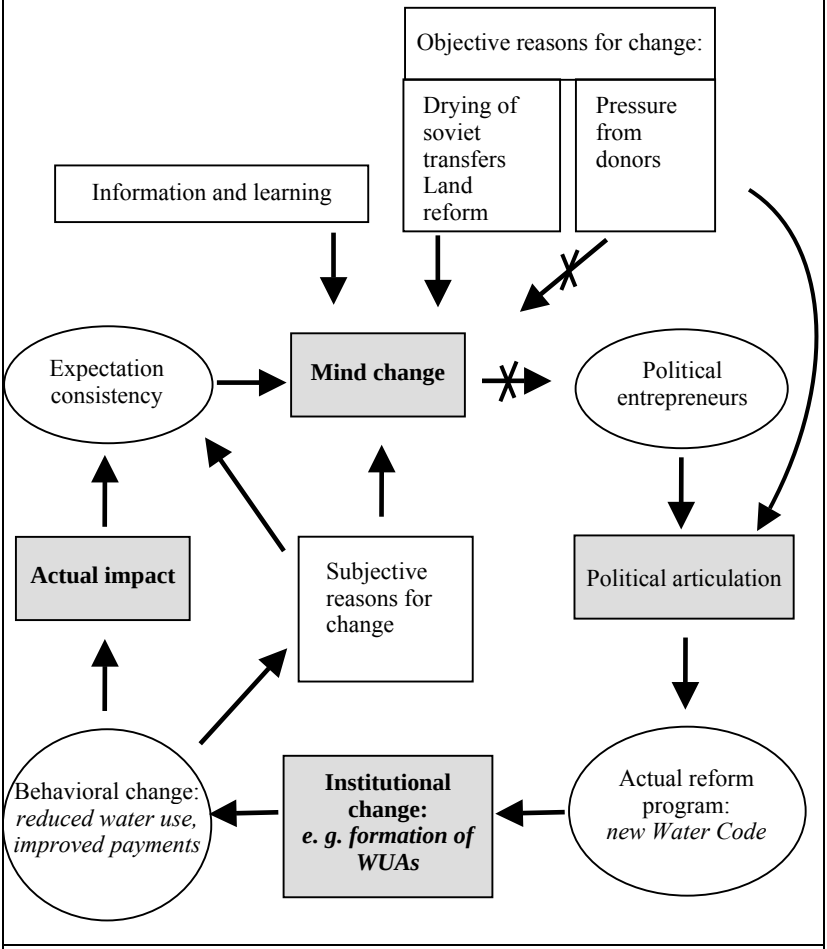
6.2.1 Objective reasons for change

Viewed through the prism of the model, external 'objective reasons for change' clearly constitute the main driving forces of Kyrgyz irrigation sector reforms (cf. Figure 9). Two of these external reasons seem to be of particular importance: First, the dismantling of the Soviet Union led both to the end of Soviet transfers to the Kyrgyz economy, causing a severe lack of funds for maintaining public infrastructure, and to the fragmentation of farm land in the course of the post-Soviet land reform. This resulted in a sharp deterioration of irrigation infrastructure on the one hand and in a misfit between irrigation management and land ownership patterns on the other. Second, international donors replaced the Soviet Union as a source of financial assistance, introducing new thinking in water management and articulating demands for IWRM-inspired irrigation sector reforms.

6.2.2 Political articulation and actual reform program

Since independence, the serious problems of the Kyrgyz irrigation sector have provided an enabling environment for externally driven reforms: As the state lacks sufficient funds and an adequate administration to provide irrigation services of satisfactory quality, overall resistance to reforms at the national level is relatively weak. Due to this openness as well as considerable donor leverage on Kyrgyz policies in general, donors are able

Figure 9: Subjective model of change, adapted to the Kyrgyz irrigation sector



Source: Adapted from Saleth / Dinar (2004, 79)

to heavily influence the 'actual reform program' of the Kyrgyz government. This resulted in the initiation of IWRM-inspired reforms before any significant mind change or genuine political demand on the side of water

users or other Kyrgyz stakeholders had occurred. In fact, 'political articulation' of agricultural water users and their representatives in Parliament is mostly limited to resistance to specific donor demands, e. g. raising water fees. Other veto players are line ministries, which have successfully opposed any consistent unification of their water-related responsibilities within the new State Water Administration. This 'political articulation' is purely reactive, however, while donors are pushing forward their technocratic, IWRM-inspired reform concepts. International consultants, figuring on donor financial strength have, for example, elaborated the new Water Code. This is why far-reaching initiatives of donors risk being out of touch with the inner-Kyrgyz political arena, complicating efforts to globally reform Kyrgyz water management, as would be required by IWRM. The newly created formal institutions are at best weakly embedded in the institutional framework and the socio-economic environment.

The external origin of reforms thus partly explains their half-heartedness. Most policy documents focus on "*regulative instruments with little regard on institutionalization*" (Baimyrzaeva 2005, 30). Donors' demands are met inasmuch as new formal institutions (in the form of legislation and policies) are established, but the related reforms (in the form of organizational rearrangements, shifted competencies and a new strategic orientation) are implemented only where they appear to be politically least problematic and financially least costly or even profitable for the state. These areas are clustered in the field of regulatory integration: farmers generally welcome their empowerment through the introduction of WUAs. Resistance to decentralization by *RayVodKhozes* is small because of their sheer inability to manage water supply to the multitude of fragmented private land plots. At least as long as the existence of *RayVodKhozes* is not questioned, decentralization thus progresses rather smoothly. By transferring tertiary canals to WUAs, the government can officially cease funding this part of the irrigation network, a burden it was no longer able to bear in any case. Improving water measurement is a mainly technical issue and thus unproblematic as well. In the short run, installing measurement devices turns out to be relatively cheap for the Kyrgyz government, as it is mostly donor-financed. The same applies to rehabilitation projects designed to reduce water losses. Notwithstanding the mounting debt that is progressively straining the national budget, donor-financed irrigation projects constitute win-win constellations for Kyrgyz actors in the irrigation sector. The fact

that shifting management structures from *oblast* to basin boundaries is a relatively small, more organizational, and politically less sensitive issue also explains progress on this aspect of ecological integration.

Politically sensitive, however, are the *objectives* of water management, i. e. the field of sectoral integration. 'Who is to benefit from water services?' is a fundamentally political question, and this explains why little progress can be observed regarding the integration of formerly underrepresented water needs. Since nature completely lacks voice and ecological concerns are only weakly embedded within the broader societal context, nature conservation comes in last for consideration. Cost recovery is the area where donor conditionalities are the strictest. This accounts for the fact that some progress has been made in this respect, in spite of continuing resistance from the former parliament to any increases in ISF.

These mechanisms explain the asymmetries within the 'actual reform program.' The politically less problematic aspects of IWRM figure prominently in the new Water Code – the reform agenda's current key document – while others figure not at all or far less prominently. In addition, there are inconsistencies between the more programmatic Water Code on the one hand and legal provisions for its implementation on the other. Stricter regulations on water quality control would be needed, for example, to set the stage for realization of the Code's environmental provisions. Again, these instruments for implementation are mostly lacking in the politically more sensitive or financially more costly areas, i. e. regarding aspects of sectoral integration and lack of advocacy.

6.2.3 Institutional change

While the 'actual reform program' is already biased, the implementation of agreed-upon reforms – i. e. the required 'institutional change' itself – is also proving to be difficult. Slow progress mostly results from particular features of current institutions in Kyrgyz irrigation management.

One common problem for implementing irrigation sector reforms is lack of enforcement power and state administration capabilities. This includes aspects like fines for water pollution, which are not consistently imposed, or the low reliability of the water quantities delivered by *RayVodKhozes*. Although the problem of lacking enforcement power is key for the success

of reforms, its resolution also poses a challenge, as this affects most sectors of public authority.

Another reason for the slow pace of institutional change is the important role played by informal institutions and organizations originally not involved in Kyrgyz water management. Because the newly introduced formal rules (laws and policies) are not rooted in informal rules, they are much more difficult to implement and enforce. As a result, they exist side by side with informal rules, destabilizing the whole system. "*The reforms neglect the informal aspects of governance, and are carried out by state agencies, which themselves have not fully internalized formal institutions and remain detached from the public*" (Baimyrzaeva 2005, 31).

Thus informal rules derived from behavioral factors tend to be at odds with newly introduced institutions. The IWRM principle of water as an economic good, for instance, contradicts the widespread perception of water as a gift of God as well as the commitment within rural communities not to cut irrigation water supply to anybody, even if he or she does not pay. Another example is the introduction of the WUA concept without any reference to former concepts of water user organizations in the country.

The involvement of organizations like *ayil okmotus* is mainly due to the weakness of newly introduced organizations, such as WUAs. This involvement has an ambiguous character, as it stabilizes water management in general but at the same time hinders new organizations in improving and fulfilling their tasks independently. In order to avoid dual structures, informal rules need to be taken into account when establishing new ones. Old institutions of water management and other forms of local self-governance organizations should be considered, e. g. when concepts for Audit Commissions or WUA federations are developed and introduced.

The fact that little progress has been made on agreed-upon reforms can also be explained by path dependency in Kyrgyz water governance. In particular, management structures inherited from Soviet times serve as a brake on institutional change that would disconcert the interests of stakeholders within the administration. The reluctance of several ministries to consistently overcome the fragmentation of tasks in water management may serve as an example.

In addition to institutional variables, there are other factors that provide explanations for the low and regionally different progress made on re-

forms. One important issue appears to be the north-south cleavage in Kyrgyzstan. Both participatory mechanisms and knowledge about water-land interaction are less developed in the north. This may be due on the one hand to a lack in the north of any agricultural tradition other than livestock breeding, whereas irrigation has been practiced for several hundred years in the Ferghana Valley. In the south, the sense of private land ownership did not disappear in Soviet times, and people consider farming more consistently as their private business. In the north, in contrast, command-and-control, top-down structures remain important. On the other hand, southern farmers face tougher constraints to production due to land and water scarcity. This might also partly explain why they pay more attention to good irrigation services and to the long-term productivity of their land.

In addition, implementation of irrigation sector reforms varies in relation to local circumstances. One key problem involved in transferring irrigation infrastructure to end water users is the vicious circle of irrigation services: Deteriorated irrigation infrastructure leads to unreliable irrigation services, which reduces the willingness of irrigation farmers to pay WUA fees. This in turn prevents the development of properly performing WUAs, which would be able to improve operation, maintenance, and repair of irrigation infrastructure.

Summing up, institutional change has made most progress in establishing formal institutions, but without considering informal rules. This has resulted in the coexistence of new water institutions with old and in part contradictory informal rules of water management. At the same time, lack of political will and/or enforcement are impeding the implementation of several new formal institutions (e. g. the implementation of Audit Commissions and Conflict Resolution Committees or adherence to the concept of hydrological boundaries, as called for in the law on WUAs).

6.2.4 Behavioral change and mind change

The ‘actual impact’ of irrigation sector reforms depends on their ability to induce ‘behavioral change’ among all stakeholders. There is only little evidence available on this change with regard to Kyrgyz irrigation farmers. Overall water use has decreased during the last years. But it is not clear whether this is due to new water-saving irrigation techniques or to more general developments in Kyrgyz agriculture. One fact that hints more

clearly at behavioral change is the rising willingness of farmers to pay irrigation fees, which indicates a departure from the traditional idea of water as a free good.

However, most positive effects on the performance of the Kyrgyz irrigation sector currently result directly from donor-financed infrastructure projects. Rehabilitation of canals has an immediate positive impact on the quality of irrigation services. It thus supports building confidence in the irrigation management system and encourages behavioral change, e. g. with regard to the willingness to pay water fees.

But behavioral change and mind change have also not yet reached the higher levels of water administration. Overall, we can note a lack of conceptual implementation of IWRM in form and content. The current path of reform is more reminiscent of patchwork, and there is no clear vision behind it. This applies, for example, for social and ecological externalities as well as for restructuring of the institutional arrangement, i. e. water management organizations. So far, the DWM has not proven up to its task of developing a vision for the water sector and strategically shaping water management reforms. Instead, it continues to manage water distribution and is reluctant to hand these responsibilities over to subordinate organizations. This is mainly due to a lack of knowledge and awareness, but also to a lack of political will and the fear of loosing authority and competencies.

The main task for Kyrgyz water managers therefore still lies ahead, namely translation of already achieved reforms and future aims into one overall concept, a national water strategy. A holistic and broadly focused strategy for water resource use involving all sectors and derived from a multi-stakeholder approach is key (GWP 2004, 27). Without such a strategy and persistent support and political will to implement it, the aim of achieving a water management in conformity with IWRM is doomed to fail.

In fact, there have already been donor projects defining water strategies, and they have led to reasonable results, but these water strategies seem to have attained only marginal awareness in society and even among water specialists, and they were not mentioned by any of the stakeholders interviewed. This is not surprising since, again, these projects were as a rule not initiated by an internal need but in response to donor demands. The

new Water Code underlines this by neglecting the existence of these strategies and calling for the elaboration of a national water strategy (Kyrgyz Republic 2005, Art. 18).

It is questionable, though, whether and how such a strategy and the further overall reform process will be developed and adopted in the future. Generally speaking, if the pace of reform towards IWRM in Kyrgyz water management is to be sustained, substantial demand for the respective reforms needs to be articulated by Kyrgyz water users and stakeholders themselves. However, most IWRM principles are weakly embedded within other societal rules. This is no surprise, given that the concept came from outside of Kyrgyz society. Up to now, reforms have concentrated predominantly on technical issues and managerial reforms. Thus far there has been no comprehensive adoption of the normative framework of IWRM. This would require a fundamental rethinking of water management and a shift in societal values. Otherwise chances are slim that IWRM will prove to be a success. What could be achieved through outside pressure and demands has already been achieved. Developments have come to a point where the initiative for the process now has to pass over to Kyrgyz stakeholders. There are first signs of such a change detectable especially at the local level of Kyrgyz water management, which should be further supported through donors continuing efforts in rehabilitation and awareness raising.

In the long run, 'mind change' is a necessary condition for continuing movement towards IWRM. Without such change, implementation of IWRM in Kyrgyzstan will become stuck or at least slow down considerably. But donors, the main push factor for water reforms, have not until now shown any major interest in such an undertaking. At least the main players, the World Bank and the ADB, mostly aim at lopsided approaches emphasizing economic aspects. The same applies for the (former) Kyrgyz government. Donors should continue to underline the importance of IWRM for a functioning and sustainable agricultural sector to the Kyrgyz government and pay higher attention to ecological and social aspects of IWRM. They should not be content with progress on paper but demand progress on the ground and with implementation of reforms. This should not, however, include predefining results. At the same time, awareness should be further raised through the provision of information on sustainable water management and use and participation of all stakeholders en-

couraged. Notwithstanding these constraints, 'mind change' cannot be orchestrated deliberately from above or outside but will have to develop over time. This may result from positive impacts of current reforms on the one hand and on the other from changing preferences of Kyrgyz society, like a sense for water scarcity or increased appreciation of nature conservation. Only if societal demand for the realization of further aspects of IWRM strengthens can a departure from the current half-hearted and asymmetrical 'way towards IWRM' be expected.

6.3 Main recommendations

Specific recommendations for each aspect of the IWRM Pyramid have already been given in the respective chapters. Due to the holistic approach of IWRM, they are numerous. Thus it seems advisable to prioritize these recommendations in order to make it easier for decision makers to concentrate their limited political and financial capital on the most promising reform steps. The following prioritization is based on two considerations: first, on the need for reform – i. e. the urgency of reforms in a specific area – and second, on the political costs of reform – i. e. the ease or feasibility of implementing corresponding policies.

— Recommendation to the Kyrgyz government and to donors: **Continue efforts to create and strengthen WUAs.**

  Further decentralization of irrigation management has a high potential for advancing different aspects of IWRM (cf. Box 7). Notwithstanding their manifold shortcomings (underqualified staff, weak organizational set-up etc.), and due to their stake in improving drainage facilities, WUAs have a high potential as change agents for realizing many aspects of IWRM, including currently more neglected ones like water-land interaction. Furthermore, WUAs are forced to achieve cost recovery for tertiary canal management, a circumstance that favors the sustainable funding of irrigation services. WUAs (and future WUA federations) are supposed to manage whole hydrological units, preferably replacing the *RayVodKhozes*. They bring water management closer to end users, thus improving responsiveness to user needs, etc. In addition, properly functioning WUAs contribute to solving many of the overall problems faced by the water management sector. These include improved enforcement of rules (like payment of fees, imposition of sanctions for illegal water abstraction, etc.) and

enhanced accountability and thus also support mind change at the local level.

Considerable progress has already been made in establishing WUAs, and the WSUs now have experienced and qualified staff. Further reforms can capitalize on this asset, as resistance to decentralization of irrigation management seems to be limited. Besides training for management and staff, further finance for infrastructure rehabilitation should be provided to WUAs in order to break the vicious circle in local irrigation management. Strengthened WUAs are more likely to overcome problems posed by interference of other actors who are currently impeding the proper implementation of decentralization reforms. Preferably, donors should provide funds in the form of grants, as the government's debt burden has already reached critical levels. WUAs that receive funds for infrastructure rehabilitation should nevertheless be asked to pay back part of the funds received. This money could then be used to set up a 'National Irrigation Rehabilitation Fund' that would provide rehabilitation loans to further WUAs.

In several places, the work of WUAs does at present reflect some first positive impacts on water management. Accordingly, farmers, as the main stakeholders in WUAs, have already begun to understand and value this work, a fact which is, for instance, reflected in a rising acceptance of water fees. In particular, appropriate incentives can be set if WUA creation is further linked to the availability of funds for rehabilitation. On the other hand, it is proving more difficult to strengthen WUAs, and this will require more time and capacity-building efforts.

— Recommendation to the Kyrgyz government and to donors: **Move further towards cost recovery in irrigation management, while assuring that social safeguard mechanisms are provided for the poorest.**

Proper funding of irrigation services is a precondition for advances in most other areas of IWRM: Drainage facilities cannot be maintained if funds are lacking, the profitability of irrigated agriculture suffers from unreliable water supply induced by underfunded infrastructure, and decentralized management structures cannot be expected to prosper if no adequate salaries are paid to WUA staff. As the resistance to fee increases on the part of beneficiaries of subsidized irrigation services continues to be considerable, political efforts have to be concentrated on convincing water users of their long-term interest in better cost recovery. Both WUA fees and ISF should be progressively increased and differentiated in keeping with to real supply costs.

It is politically difficult to increase WUA fees and ISF since there has been considerable resistance to this topic by parliamentarians in the past. Given the political situation, this is likely to continue, since the new parliamentarians seem even more reliant on their constituencies in rural areas. Nevertheless, there is scope for raising ISF for several reasons. First, in the end these fees have been introduced because of massive donor pressure in the past. This pressure by relevant donors like the World Bank continues and there are plans to come up with estimates on real costs of water delivery by the end of 2005. Second, with the introduction of WUAs and in view of their (at least in some parts) growing ability to improve irrigation infrastructure and management, the acceptance among farmers of fees for water delivery has increased. Both donor pressure and rising acceptance among farmers make further fee increases a realistic option.

But initiatives aimed at better cost recovery should not neglect negative social externalities of fee increases. Thus adequate safeguards for the poorest have to be provided. Better targeted and increased social assistance from the national budget are desirable options. However, additional mechanisms of cross-subsidization via 'social funds' should be created within WUAs in order to further limit risks of social hardship.

— Recommendation to the Kyrgyz government: **Realize the new water management structure, as foreseen in the Water Code, with a special emphasis on integrating non-agricultural water users**.

Key provisions of the new Water Code include the reorganization of the water administration in accordance with hydrological units and a clear inter-sectoral orientation of the planned National and Basin Water Councils. At present, the DWM and its regional branches are heavily dominated by agriculture, sidelining other water uses such as drinking water supply and tourism. Probably, a more balanced representation and real leverage of these two sectors on national and basin water policies could not only promote economic efficiency, thanks to a possible re-allocation of water from agriculture to other uses, it could also strengthen the integration of social (human health) and ecological (conservation of nature) externalities. This might contribute positively to sectoral integration.

As the first steps toward implementing the new water administration have shown in the past, this is a task difficult to achieve given the reluctance of most agencies involved. The current reorganization of the political administration in general should therefore be used as a

window of opportunity to shift staff and adjust the water management structure at the same time.

— Recommendation to the Kyrgyz Parliament: **Amend the new Water Code, strengthening ecological concerns and introducing a provision on WUA federations.**

The new Water Code is an important legal tool for advancing IWRM in Kyrgyzstan. Nevertheless, it could and should still be improved. Ecological concerns, for example, feature prominently only in the Code's general, more programmatic articles. They should also be integrated into the more concrete provisions, adding for example an ecological flow requirement to the provisional water use priorities of basin water use plans. Another shortcoming seems to be that WUA federations are not mentioned in the Code. However, in the future they are expected to take over the *RayVodKhozes'* tasks of irrigation water supply. This needs to be clarified in the document. In order to avoid ambiguity, respective provisions should thus be added to the Water Code to improve the internalization of ecological externalities on the one hand and to press on with the decentralization of water management on the other.

In particular, though, the introduction of WUA federations seems to be a politically sensitive issue. Most reluctance to hand over responsibility to WUA federations is, however, found not at the *RayVodKhozes*, where staff already plan to become engaged in these federations, but at the national level of administration. Therefore, in order to provide for compensation in tasks and support the DWM in fulfilling its original tasks, further measures should be taken to strengthen the DWM's ability to engage in strategic planning.

— Recommendation to *ayil okmotus*, extension services and donors: **Increase agricultural knowledge among farmers.**

Insufficient integration of water-land interaction in local irrigation management endangers the long-term sustainability of water use patterns. Many farmers, particularly in the north, lack knowledge on these issues. Know-how on new farming techniques and best practices in irrigation farming is also limited to a minority of farmers. This undermines not only the ecological sustainability of agriculture but also its productivity and profitability. Agricultural extension services should thus be encouraged to offer training on these questions to both farmers and WUA staff. Due to their partly public-good char-

acter, attendance at these trainings could be subsidized, in particular for poor and inexperienced farmers.

6.4 Resume and outlook

At present Kyrgyz irrigation management is proceeding on its 'way towards IWRM.' Even though the process started out only a few years ago, progress towards implementing IWRM in Kyrgyzstan has been remarkable. This is especially true if we take into account the enormous burden of change Kyrgyz society had to contend with since independence.

Nevertheless, realization of IWRM-conform water management is still to come in Kyrgyzstan. Significant steps have been taken, and there are more to follow, but these steps have not been bundled through an underlying overall concept or vision. The current situation is more like patchwork, focusing on those pieces of IWRM which are easy to implement both economically and politically. But it is not enough to undertake mainly technical and organizational reforms. IWRM requires fundamental changes in water strategies and concepts in the water sector, which have not yet been undertaken in Kyrgyzstan. Reforms towards IWRM have been achieved mainly because donors have pushed the country into them. Therefore, even though reforms are leading in the right direction, so far they consist only of separate steps. The fact that the reforms were not rooted in mind change has not been crucial in that these reforms have mainly been of a more 'technical' nature. But for the further realization of IWRM it is crucial to develop an overall strategy based on the preferences and the commitment of society. As long as this has not happened, further steps designed to take the project of water management reforms in Kyrgyzstan further down the road towards IWRM are unlikely to occur.

The revolutionary overthrow in March 2005 and the subsequent formation of a new government could temporarily slow down the pace of reform, as the political situation is unstable, staff is changing and the new government may adopt a more populist attitude towards the rural population. On the other hand, these events might provide the needed window of opportunity to undertake pressing changes in the water management structure and administration. But the new government has so far not excelled at adopting policy changes or developing innovative reform steps. In addition, chances are that the pace of reform is, (at least) temporarily, slowed down, as staff

is changing and the new government is adopting a more populist attitude towards the rural population.

However, the analysis also raises questions about the more distant future of Kyrgyz irrigation sector reforms. The notable asymmetries between single aspects of IWRM, in particular, are problematic. Even though it is up to democratically elected Kyrgyz decision makers to define societal preferences and thus to prioritize the objectives of Kyrgyz water management, the clear-cut neglect of sectoral integration contradicts the holistic ambition of IWRM. Modern water management acknowledges that ecological, economic and social spheres are interdependent. Thus additional efforts geared to integrating ecological, economic, and social externalities are highly recommendable.

WUAs play a crucial role as change agents in the reform process. But until now they have mainly been initiated for economic reasons – because they amount to an important prerequisite to apply for credits and other finance from donors. Once donors withdraw from this field, WUAs will have to be able to legitimize themselves not on the basis of the money they guarantee for rehabilitation measures but through the service they provide to their members. This point will be crucial for the further path of Kyrgyz water management towards IWRM.

In view of these findings, the question is whether the concept of IWRM, as it exists today, is appropriate for developing countries and countries in transition. It has to be acknowledged that IWRM is very ambitious and, if taken seriously, requires many institutional and organizational changes and changes in thinking as well as financial inputs and commitment from the relevant countries. Since water management and water governance are not the only problems these countries have to contend with, taking IWRM seriously may overburden these countries and could in the end even generate counterproductive outcomes. Therefore, efforts should be made to identify core principles of IWRM and prioritize the relevant measures in order not to overburden developing and transition countries on their way towards IWRM.

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Glossary

aksakal	Elder, 'white beard'
aksakal sotu	Court of elders
ashar	Voluntary community work
ayil bashi	Village head
ayil okmotu	Body of local self-government
Gidromet	Hydrometeorological administration monitoring air, water and soil quality
kenesh	Elected representative body on all administrative levels
ketman	Traditional water user association
kolkhoz	Large-scale agricultural enterprise in the former Soviet Union, organized by a collective of farmers who owned the means of production but not the land
mirab	Water master
mirab bashi	Main water master in traditional water management
oblast	Province
OblVodKhoz	*Oblast* Basin Water Management Department
rayon	District
RayVodKhoz	*Rayon* Water Management Department
Som	Kyrgyz currency
Sovkhoz	The term Sovkhoz designates a large-scale agricultural enterprise in the former Soviet Union owned and managed by the central state with employed farm workers.
Tyiyn	Kyrgyz currency, 100 tyiyn = 1 som

Appendix: Empirical approach

Instruments used for data collection

The empirical research in Kyrgyzstan was based on qualitative methods. Qualitative data are essential to address the questions posed by the present research and to identify potentials for and obstacles to the implementation of IWRM, as well as their causal mechanisms.

Apart from the literature review, which was the basis of the preliminary desk study and was continued during the field research, the main instrument of the empirical research was the guided semi-structured interview. Several compendiums of questions were developed, each of them focusing on one group of stakeholders. For the definite choice of interview partners, the research partly relied on established contacts in Kyrgyzstan and to a certain degree on the 'snowball system,' i. e. recommendations by interviewed persons. Basically, the water management hierarchy for the selected research areas was followed downwards, from the national level to the regional and local levels, ending with Water User Associations (WUAs) and water users.

The interviews were generally conducted in teams of two persons and in most cases accompanied by an interpreter. Except for several interviews held in English and German, most interviews were conducted in Russian or Kyrgyz with the help of translation. The data was organized with the help of the software Atlas.ti®.

With a view to better validation, the data collected were crosschecked by 'triangulation' wherever possible. Therefore, information on the same aspects was collected from different interview partners, and then the statements were compared, also with sources from the literature or the Internet. This approach was especially important to secure the inclusion of the diverse perceptions and interests of various stakeholders.

Another method applied especially at the local level was 'participatory observation.' The authors had the opportunity to participate in two WUA meetings, one general assembly (GA) of water users, and one meeting of members from several WUAs that were considering unification. These observations, which were also taken down in protocols, made it possible to gain insight into the functioning of these organizations. Other situations in which participatory observation was used were guided transects through

Table 3: Interviews conducted, by stakeholder groups								
Stakeholder group	Academics	Donors	Administration	NGOs	WUAs	Farmers	Other*	**Total**
Number of interviews	13	15	26	8	13	16	9	**100**
* The category 'Other' includes protocols from guided transects, meetings of water users, and annotations from informal talks.								

the WUAs' service areas. Three of these visits were carried out, all of them guided by local farmers or water managers. They conveyed an immediate visual impression of the problems and the ways in which local people perceived them.

Main stakeholders

Prior to the field research, the key stakeholders (organizations and individual stakeholders) involved in water management were identified on the basis of a comprehensive literature review. Based on this first analysis, the relevant stakeholders were classified into six main groups: academics, donors, administration, NGOs, WUAs, and farmers. During the field research in Kyrgyzstan, 100 interviews were conducted with persons from these stakeholder groups, as shown in Table 3. Of these interviews, 29 were conducted on the national level in the capital Bishkek, 38 with stakeholders in the northern research areas, and 31 with stakeholders from the southern regions.[1]

Geographical focus

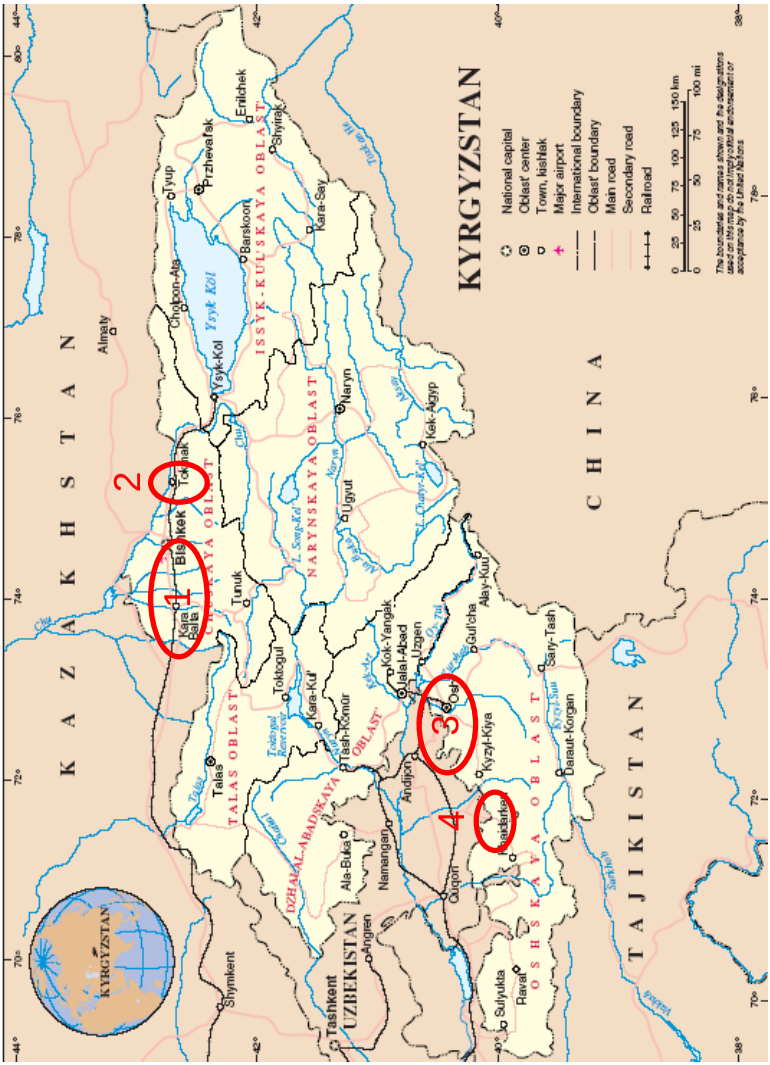
The research was concentrated on previously defined geographical areas. Due to the climatic, cultural, and socio-economic differences between the northern and the southern parts of Kyrgyzstan, empirical research had to

1 Two of the interviews, both with academic experts, were not conducted in Kyrgyzstan. One of them took place in Tashkent, Uzbekistan, the other in Germany.

be conducted in both. The major areas for irrigated agriculture correspond to the main river valleys. The two most important regions were chosen with a view to population and agricultural production: the lower Chu basin, located in the north of the Kyrgyz Republic (Chui *Oblast*), and a part of the Kara Darya basin in the southern Ferghana Valley (Osh *Oblast*). Within these regions, the majority of the interviews were conducted in the following districts (cf. Figure 10):

- *Chui Oblast*: Sokuluk *Rayon* and Panfilov *Rayon* (1), Chui-Tokmok *Rayon* (2)
- *Osh Oblast*: Aravan *Rayon* and Kara-Suu *Rayon* (3)
- *Batken Oblast*: Kadamjay *Rayon* (4)

Figure 10: Map of the Kyrgyz Republic with selected research areas



Source: UN Department of Peacekeeping Operations, Cartographic Section (2004)

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