

## Part IV

# Coping with Change: Understanding Transformation Processes in Central Asia





## **13 Adapting Research in a Complex Highland–Lowland Context in Transition**

Daniel Maselli<sup>1</sup> and Nazgulmira Arynova<sup>2</sup>

### **13.1 The long shadow of the past**

For centuries, if not millennia, large parts of contemporary Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan were home to nomadic people who moved with their animals according to seasonal fluctuations, climatic conditions, and corresponding fodder availability. Clan structures developed, and mechanisms of spatio-temporal land use were reflected in regulatory institutions. With the emergence of Tsarist Russia in the 19<sup>th</sup> century, this traditional system underwent an initial major change as new permanent settlements were founded in fertile lowlands, such as the Chuy Valley, which had previously been used as winter pastures. New agricultural practices based on extension of gravity-driven irrigation systems were introduced.

Land use broadened drastically in scope and intensified when, in the early 1920s, the Soviet Union took control of the region, creating the Tajik Autonomous Soviet Socialist Republic and the Uzbek Soviet Socialist Republic (both in 1924), and two years later the Kyrgyz Autonomous Soviet Socialist Republic, in order to expand its sphere of influence and action. The cultivated area and the number of livestock gradually multiplied owing to large-scale infrastructure development, resulting in increased productivity but also heavy pressure on natural resources.

The movement of animals traditionally followed seasonal rhythms, and livestock numbers were regulated by fodder shortages such as the well-known winter bottleneck. Nevertheless, the construction of access roads to summer pastures, transport of large numbers of animals by truck, and the provision of huge amounts of winter hay brought by train from neighbouring countries, particularly Kazakhstan, allowed for a substantial intensification of livestock rearing. This was complemented by veterinary, breeding and animal processing services as well as by large-scale fertilising and weed control mechanisms using airplanes in mountainous terrain. A large number

of animal barns were constructed above the valley bottoms, which kept the livestock away from intensively used agricultural fields in the lower and flatter areas.

This externally driven, highly mechanised and subsidised land-use system collapsed when the Soviet Union disintegrated in 1990 (Luong 2004). Russia's withdrawal also led to the breakdown of many highly specialised industrial production units, leaving people without an income. Given the natural conditions in Kyrgyzstan and Tajikistan, where more than 90% of the territory is covered by mountains, the population had to revert to self-subsistence, relying mainly on pastoral resources and small-scale agriculture and horticulture. However, the previous large-scale, top-down and technocratic orientation of both agriculture and livestock production during the Soviet period had tapped land and water resources in a way that made adaptation for individual livelihoods extremely difficult, for example with regard to the over-dimensioned water distribution infrastructure that was now no longer maintained, or the sophisticated livestock transport and feeding system described above. On top of this, challenges posed by global change, such as trade regulations for import and export of agricultural products, affect difficult transition processes (Figure 1); this is also a factor that needs to be taken into account when trying to understand processes of change, what triggers them, and possible solutions to problems in this highly dynamic and unstable region of the world.

Since independence in 1991, society at large as well as governmental and administrative structures have had to adapt to a completely new situation (Luong 2004). This led to an only partly controlled and rather complex set of reactions and adaptations, where traditional and new institutions, along with a political vacuum, emerged simultaneously. The collapse of support mechanisms – in particular for the industrial and agricultural sectors and for service sectors such as health and education – and the discontinuation of infrastructure construction brought about an era of total decline, with productivity in all sectors nearly coming to a complete halt. The struggle for mere survival caused many families to revert to subsistence farming, although they had little agricultural knowledge and experience and few tools. The repatriation of former Soviet inhabitants to their home country, Russia, added to the loss of both know-how and do-how. It took the former Soviet republics some time to recover from this shock and start developing appropriate new structures oriented towards a sustainable future in a now market-driven context (Dukenbaev and Hansen 2003).



Fig. 1  
The importance of trade in Central Asia has been increasing over the past decade. This concerns domestic trade as well as trade among Central Asian states and beyond, in particular trade with China and Russia. (Photo by Daniel Maselli)

While this led to improvement with respect to previous over-utilisation of land resources in certain areas, it increased pressure in other areas, particularly on pastures near villages, because people could no longer afford transportation to the high summer pastures and had lost the habit of transporting animals there. Generally, people were confronted with a range of ‘existential’ questions, and uncertainty reigned. In this context, the research conducted in the framework of the Swiss National Centre of Competence in Research (NCCR) North-South sought to help find meaningful responses to some of the burning issues related in particular to sustainable land management.

### 13.2 Burning issues and a shift in paradigm

Before the first NCCR North-South PhD and Master’s studies were launched in the Joint Area of Case Studies (JACS)<sup>3</sup> Central Asia (CAS), the major problems and potentials were assessed jointly with external and internal specialists. Most key issues identified were directly related to more sustainable use and management of natural resources: How could large-scale water management systems be adapted to small-scale farming? How could over-used pastures be rehabilitated and animal movements re-adapted to seasonal fluctuations of vegetation? How could land degradation be reduced and

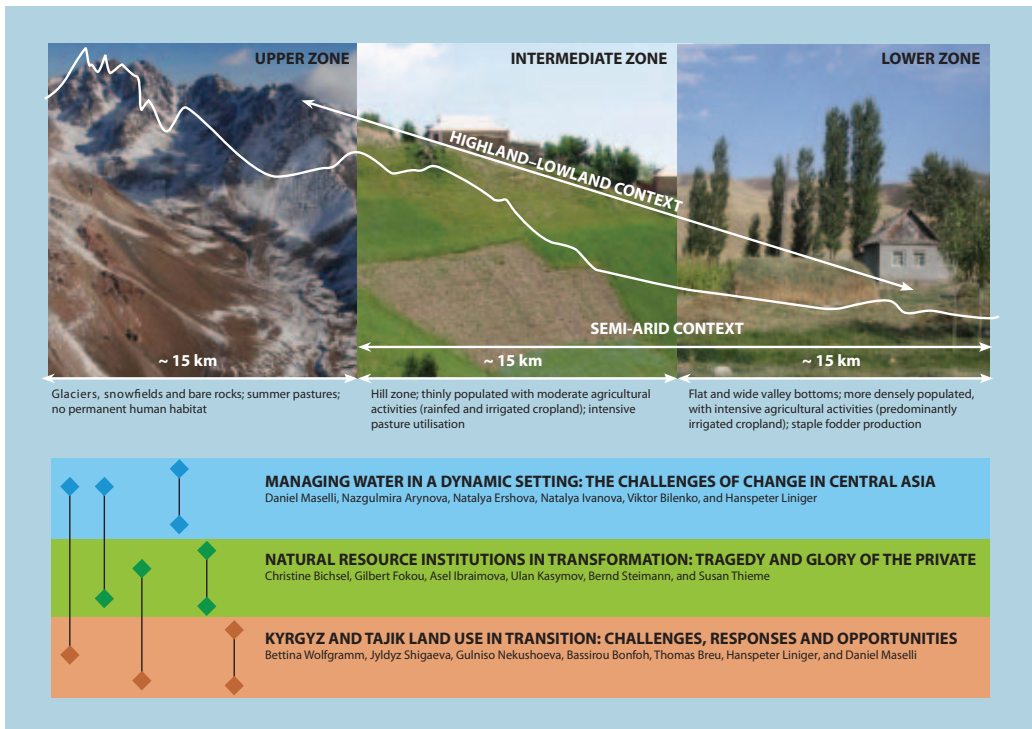
soil conservation and fertility improved? Eventually, three guiding themes emerged towards the end of Phase 2 of the NCCR North-South programme: 1) *Water Management and Agriculture*; 2) *Pasture Management and Livestock*; and 3) *Livelihoods and Institutional Development*.

Initially, however, the work of the highly specialised scientists and academic institutions involved remained more or less detached from ‘field reality’; their research was based mainly on earlier Russian literature, as they were not used to collecting genuine primary data through field research. State-of-the-art Western approaches, methodologies and concepts required time to be absorbed and called for a profound shift in paradigm among local scientific partners as well as openness and a readiness to understand the local framework among the Swiss partners. Mutual administrative and procedural requirements and individual academic habits and mindsets posed further obstacles. Eventually, however, the partners succeeded in blending the two research traditions.

Against this background, a pragmatic approach was adopted to launching research activities in Kyrgyzstan and Tajikistan. Acknowledging the general lack of financial resources among academic and research institutions, as well as the dramatic exodus of former Russian faculty members, research activities were designed to compensate for these losses and to allow for adaptation to new scientific orientations as well as for a major shift in paradigm. Efforts had to be combined and synergies created, leading to linkage between several PhD and related Master’s studies (Figure 2) and allowing for shared coaching of students involving local professors from different backgrounds and corresponding Swiss partners. Joint training and regular field missions improved mutual understanding of people’s real problems, generated appropriate research methods, and led to expected scientific results; ultimately, these common activities made it possible to meet NCCR North-South standards and to respect the requirements of local academic host universities.

### **13.3 New primary field data and capacity strengthening**

The jointly designed studies offered opportunities for fieldwork, generating considerable novel data, often from comparative case studies. This major output helped to enhance understanding of local dynamics and raise interest and participation in research activities among the local population and



authorities. It also led to a blending of local/traditional and scientific knowledge. The studies helped to strengthen individual and institutional capacities as well as to widen partner networks and intensify collaboration. Presentations and discussions of results at village workshops, and the organisation of ‘Open Days’ for policy- and decision-makers also enabled validation of and capitalisation on research. Thanks to the primary data gathered, JACS CAS researchers were invited to participate in regional and international events and processes. This provided excellent opportunities for them to share their improved understanding of integrated water and land management, climate change, pasture utilisation and migration, and to increase the visibility of the programme.

Fig. 2  
Conceptual framework for an integrative approach in initial PhD and Master’s studies in the Joint Area of Case Studies (JACS) Central Asia (CAS).  
(Diagram and photos by Daniel Maselli and Bettina Wolfgramm, 2003, modified in 2009)

### 13.4 Combined research foci for increased societal relevance

The implementation of transversal projects on migration, human security and pastoral production systems promoted more integrated approaches and innovative ways of producing and communicating research results. Documentary movies such as “The Other Silk Road” and “Voices from the Hills and Valleys” actively involved directly concerned stakeholders and disseminated important messages to a wider public, while stimulating lively debates with an impact on the views and the knowledge of people and decision-makers.

Similarly, the creation of a herders’ newspaper and radio programme in Kyrgyzstan generated highly positive reactions from rural inhabitants now receiving relevant information in their native language, and gave different target groups a voice for raising issues and concerns, commenting on political decisions, and publicising their own ideas and visions. This instrument has promoted strengthening of self-assurance and ownership among rural

Table 1

PAMS	Location and duration	Main outcomes
Cleaning and Reconstruction of Drainage Network on the Fields of Pervomaisky Village Council	August – September 2003, Sokuluk Rayon, Kyrgyzstan	This project made it possible for employees of the KOSS agricultural cooperative and several smaller farms to use the arable land on the territory of Pervomaisky Village Council. 205 ha of irrigated land – 178 ha belonging to KOSS, 37 ha to other farms – were improved. Salinity of the land decreased, improving the soil and enhancing the productivity of agricultural crops.
Cotton Growing Under Plastic Cover in Khorezm Region	February – November 2003, Khorezm Oblast, Uzbekistan	The newly introduced technology of growing cotton under oilcloth decreased water consumption by 30%, reduced the cotton seeds’ germination period by 5–6 days, improved the process of cotton development, lowered consumption of herbicides, and increased cotton yields.
Producing High-quality Kitchen-herb Seeds and Greengrocer’s Crops	March – December 2003, Issyk-Kul Oblast, Naryn Oblast and Bishkek, Kyrgyzstan	Local production of high-quality kitchen-herb and lettuce seeds was established; 1 agronomist and 5 jobless people were trained in producing and harvesting seeds. 7 lecture-excursions and 4 training events on growing technologies, procurement and storage of kitchen herbs and lettuce were held for 170 people from various stakeholder groups in 3 regions of Kyrgyzstan.
Description and Popularisation of Soil and Water Conservation (SWC) Technologies and Approaches on Farms of the Republic of Kazakhstan	September 2003 – August 2004, Kazakhstan	A database of farms in the Republic of Kazakhstan with existing land management problems was created, followed by a database of 45 SWC technologies applied in Kazakhstan. This was used to disseminate SWC technologies among farms. Documentations on 6 technologies and 5 approaches used in Kazakhstan were submitted to the World Overview of Conservation Approaches and Technologies (WOCAT).



Fish Protection in Mountain River Water Intake Structures for Irrigation and Power Production	July 2004 – August 2005, Sokuluk Rayon, Kyrgyzstan	Construction and demonstration of a fish protection system on Sokuluk River stopped the continuous decrease in the fish population, thus contributing to biodiversity restoration in the basin.  The fish protection system was successfully replicated and installed on Djuuku River in Issyk-Kul Oblast, and patented in 2006. 3 scientific articles were published in local journals.
Rehabilitation of Soil and Vegetation on Desert Pastures of Aidarly Village for Sustainable Development of Rural Community	January – December 2005, Almaty Oblast, Kazakhstan	Implementation of a new pasture use strategy helped to solve problems of biodiversity rehabilitation, improve fodder reserves, conserve soil fertility, and stabilise ecological conditions, thus improving the living conditions of local rural communities.  Following this strategy based on shifting pasture sites and on recommended animal grazing rates and plant alienation ratio also helped to achieve a certain cost-effectiveness.
Integrated Natural Resources Management for Poverty Reduction in Mountain Areas	April 2004 – October 2007, Zeravshan Valley, Tajikistan	Implementation of SWC measures reduced soil erosion on rainfed and irrigated cropland. Field trainings for farmers on SWC technologies were conducted.  Newly released local varieties of seeds were purchased and tested during the winter of 2005/2006; 10 farmers were trained in plant nutrition management.  The project contributed to a publication by WOCAT in 2006.
Pastoral Information System for Kyrgyzstan	March 2008 – July 2009, Kyrgyzstan	The newspaper “Aiyl Ajary” was registered and its editorial board established; personnel was trained and a multi-media studio set up. The newspaper is published monthly at a print run of 5000 copies, which are distributed free of charge; printing costs are largely covered through advertising. In addition, the studio produces a regular weekly radio programme and has also produced 2 TV broadcasts.

communities in Kyrgyzstan. It is likely to be replicated in Tajikistan with the help of local actors, as similar societal needs exist there and responses were very positive and enthusiastic. This project was one of several innovative Partnership Actions for Mitigating Syndromes (PAMS)<sup>4</sup> carried out in Central Asia (Table 1).

For the PhD and Master’s students involved, as well as for local supervisors, an interesting mix of novel combined approaches and methodologies was introduced, culminating in jointly published peer-reviewed articles. Findings such as those concerning the anticipated impact of accelerated glacier melting on river flow and irrigation (see Chapter 14 in the present volume) were presented at various regional and international conferences and to the local population. Awareness of the problems of climate change and its likely impact on farmers has increased as a result of this type of research and its dissemination. Similarly, the problem of pasture degradation was tackled jointly with the herders concerned – the future custodians of these vast resources (see Chapter 15 in the present volume). Migrants were directly involved in analysing the pitfalls and dangers of long-distance migration

Main outcomes of the Partnership Actions for Mitigating Syndromes (PAMS) implemented in Central Asia during Phases 1 and 2 of the Swiss National Centre of Competence in Research (NCCR) North-South programme.

(see Chapter 16 in the present volume). This active involvement of target group representatives meant a major shift in paradigm for the local students and supervisors, which has contributed to a different way of addressing everyday societal issues.

### 13.5 Pathways for future research

The leading themes for Phase 3 reflect an intention to emphasise analysis of interlinkages between natural resources, people, and the governing institutional arrangements. This approach will help to find appropriate pathways to develop useful tools for reacting and effectively adapting to rapid changes. Studies will address burning issues such as climate change, its impact on livelihoods, and the necessary individual and collective adaptation and mitigation responses (Figure 3). This should then be complemented by and embedded into new regulatory frameworks to secure sustainable use of natural resources. In this sense research related to pasture and livestock management will be extended to Tajikistan in order to fill a gap and respond to the needs and requests of the local population.

Fig. 3  
Nomadic life still plays an important role for Central Asia's people; however, it is unclear whether future generations can identify with this form of life given the hardships that characterise it. (Photo by Daniel Maselli)



Thanks to a new strategic partnership with the University of Central Asia (UCA), future research will be carried out involving relevant development actors such as the Aga Khan Foundation and the Aga Khan Development Network (AKDN). Research will be more closely linked to development partners and existing relevant programmes such as the Mountain Societies Development Support Program in Tajikistan, and research findings will benefit the target communities more directly. Further research will be conducted within the projects entitled “Migration and development revisited”, “Sustainable land management systems for enhancing food security and mitigating climate change”, and “Dynamic socio-ecological conditions, resource scarcity and adaptation to climate change”.

### **13.6 Communicating with societal actors**

So far, effective communication of research specialists with both policy- and decision-makers as well as with society at large has been rather poor. This gap has already been addressed by a policy brief on migration, a fact sheet on brucellosis, and an ‘Open Day’ on pasture and livestock management produced and organised by the NCCR North-South.

In order to further increase the relevance and impact of research, it is important to create new instruments for exchanging ideas and information among different societal actors. A broader dialogue will be promoted through regional conferences addressing issues such as land-use change and livelihood adaptations or climate change and migration (Figure 4). A first regional workshop on brucellosis took place in 2008 involving participants from Kazakhstan, Tajikistan, Uzbekistan and Mongolia. The development and implementation of novel action research projects will lead to a new ‘meta-disciplinary approach’ involving policy and economic actors and paving the way for regular exchange fora. Results and findings will be disseminated using all appropriate instruments of the mass media.

### **13.7 Joining hands with national, regional and global partners**

Based on existing partner networks and using new opportunities, strategic collaborations will be developed. The creation of a new research centre and a Central Asian Mountain Monitoring Network (CAMMoN) by UCA will



Fig. 4  
A meeting among  
the villagers of  
Sogment, Kyr-  
gyzstan, to dis-  
cuss their next  
steps in an escalat-  
ing conflict over  
water resources.  
(Photo by  
Christine Bichsel)

involve a variety of national, regional and international actors and promote collaboration among governmental and non-governmental entities. CAM-MoN will ensure long-term assessment of relevant parameters for understanding processes of change and provide valuable information for policy- and decision-making, education, training, research, analysis, publications, development interventions, global comparisons, etc. The open access nature of data storage is expected to become a landmark for information sharing in transboundary settings. The research centre will offer opportunities to enhance regional collaboration, and will act as an umbrella institution for new regional initiatives and programmes such as the Central Asian Countries Initiative for Land Management (CACILM) or projects funded through the Global Environmental Facility (GEF). This will also help to strengthen collaboration with the International Centre for Integrated Mountain Development (ICIMOD), thus establishing closer relationships with the neighbouring Hindukush, Karakorum and Himalayan mountain systems. At the global level, active participation in worldwide networks such as Mountain Forum or Mountain Partnership are opportunities to better link Central Asia with global discourse on sustainable mountain development, to facilitate exchange of experiences, and to promote collaboration, with the ultimate goal of improving people's livelihoods.

## Endnotes

### Full citation for this article:

Maselli D, Arynova N. 2010. Adapting research in a complex highland–lowland context in transition. *In: Hurni H, Wiesmann U, editors; with an international group of co-editors. Global Change and Sustainable Development: A Synthesis of Regional Experiences from Research Partnerships*. Perspectives of the Swiss National Centre of Competence in Research (NCCR) North-South, University of Bern, Vol. 5. Bern, Switzerland: Geographica Bernensia, pp 211–222.

### Acknowledgements:

The authors acknowledge support from the Swiss National Centre of Competence in Research (NCCR) North-South: Research Partnerships for Mitigating Syndromes of Global Change, co-funded by the Swiss National Science Foundation (SNSF), the Swiss Agency for Development and Cooperation (SDC), and the participating institutions.

<sup>1</sup> Daniel Maselli is Senior Research Scientist at the Centre for Development and Environment (CDE), University of Bern, Switzerland, and Associate Senior Research Fellow at the University of Central Asia (UCA) in Bishkek, Kyrgyzstan. His main field of expertise is natural resource use in semi-arid mountain regions with a particular focus on transhumance and sustainable pasture management. He recently joined the Swiss Agency for Development and Cooperation (SDC).

E-mail: [daniel.maselli@ucentralasia.org](mailto:daniel.maselli@ucentralasia.org), [daniel.maselli@deza.admin.ch](mailto:daniel.maselli@deza.admin.ch)

<sup>2</sup> Nazgulmira Arynova is Regional Coordinator for the Swiss National Centre of Competence in Research (NCCR) North-South in Central Asia (Joint Area of Case Studies Central Asia or JACS CAS).

Address: Regional Coordination Office, JACS Central Asia

#207 Panfilova Street

Bishkek 720040

Kyrgyzstan

E-mail: [mira.arynova@ucentralasia.org](mailto:mira.arynova@ucentralasia.org)

<sup>3</sup> The NCCR North-South is based on research partnerships with researchers and research institutions in the South and East. These partnership regions are called JACS (Joint Areas of Case Studies). Regional Coordination Offices (RCOs) were established in each of these JACS at the outset of the programme. The original function of the RCOs was to coordinate research; in the third phase of the programme, RCOs will consolidate the existing research network in the South and will become hubs for generating new research projects and partnerships.

<sup>4</sup> Partnership Actions for Mitigating Syndromes (PAMS) are projects implemented by local actors together with scientific and non-scientific stakeholders. As a component of the NCCR North-South programme they are designed to implement and validate approaches, methods and tools developed in research, with a view to finding promising strategies and potentials for sustainable development. Moreover, they are intended to promote mutual learning and knowledge-sharing between academic and non-academic partners in sustainable development.

## **References**

- Dukenbaev A, Hansen WW. 2003. *Understanding Politics in Kyrgyzstan*. DEMSTAR Research Report 16. Aarhus, Denmark: DEMSTAR [Democracy, the State, and Administrative Reforms] programme, University of Aarhus. Available at: <http://www.demstar.dk/papers/UPKyrgyzstan.pdf>; accessed on 25 August 2009.
- Luong PJ, editor. 2004. *The Transformation of Central Asia: States and Societies from Soviet Rule to Independence*. Ithaca, NY: Cornell University Press.

## 14 **Managing Water in a Dynamic Setting: The Challenges of Change in Central Asia**

Daniel Maselli<sup>1</sup>, Nazgulmira Arynova<sup>2</sup>, Natalya Ershova<sup>3</sup>, Natalya Ivanova<sup>4</sup>, Viktor Bilenko<sup>5</sup>, and Hanspeter Liniger<sup>6</sup>

### **Abstract**

This paper summarises research activities related to water and water management carried out mainly in Kyrgyzstan and Tajikistan between 2002 and 2008, and anchors them in a broader regional water management context. Results show that climate change and socio-political transformation processes have heavy impacts on the condition of natural resources as well as on people's livelihoods. While rapid glacier retreat is providing more water for agriculture, river flow modelling suggests a forward shift of the main water discharge from the end of July to June. This may lead to more acute water shortages in the lowlands towards the end of the summer period. Dilapidated irrigation infrastructure, institutional failures, and inappropriate use of water by inexperienced farmers are the main reasons why less than 30% of the water reaches its final destination. The rapid proliferation of Water Users' Associations is an attempt to address these issues, while external actors try to influence water policies and actions at a larger scale.

**Keywords:** Water management; irrigation; Water Users' Association; transformation economy; climate change; Kyrgyzstan; Tajikistan; Central Asia.

## **14.1 Water management during the Soviet era and after independence**

### **14.1.1 Water – an eternally pivotal resource in Central Asia**

Water has always played and will continue to play a crucial role in Central Asia, particularly in irrigated agriculture and energy production (Molden and de Fraiture 2004). Traditional irrigation practices in the region date back more than three millennia. In Tajikistan, 93% of the total freshwater withdrawn is used for agriculture, but only 83% of it reaches the fields (UNEP/GRID 2002). The total area of irrigated land in the region has increased steadily, almost tripling during the 20<sup>th</sup> century, and now totals more than ten million ha (Bilik 1990). This tremendous increase is mainly due to the introduction and construction of large-scale irrigation schemes in favourable locations such as the Ferghana and Chuy valleys (Sobolin 1990). During this period water was understood to be a resource provided free of charge by authorities to collective farms and state farms, i.e. *kolkhozes* and *sovkhozes*. In general, water consumption is increasing steadily in the region. In Tajikistan it has increased by 40% over the last thirty years; currently 74% of the water consumed is used in agriculture, with an average consumption of 14–16 m<sup>3</sup> per ha. This high amount could be reduced by up to 25% through more efficient irrigation methods (UNEP/GRID 2000).

### **14.1.2 Tapping land resources through irrigation infrastructure**

During the Soviet era huge investments were made to develop the water sector, including water sanitation, irrigation and energy-generating infrastructure for local and regional needs (Mamatkanov et al 2006). While engineers created large-scale irrigation schemes such as channels and reservoirs, agricultural specialists elaborated specific sowing plans and irrigation norms on a technocratic basis, adapted to local climatic conditions and river flow regimes (Bilik 1990). In Tajikistan and Uzbekistan, the Soviet policy of acquiring a leading position in the world cotton market led to the cultivation of vast arid and semi-arid lowland areas, requiring huge amounts of irrigation water (Schaap et al 2004). This precious resource was abstracted from the Amudarya and the Syrdarya, the two major rivers flowing to the Aral Sea. Ultimately this led to the Aral Sea tragedy (Martius et al 2005; Pala 2005). The vast water resources of the Tajik Pamirs and the Kyrgyz Tien-Shan mountains were identified as having a huge hydro-electric potential.



Accordingly, large-scale power stations and water dams were constructed (Mamatkanov 2000). Water resources were managed through a range of independent institutions (Vinogradov and Langford 2001).

### 14.1.3 Losing the Soviet heritage

The rapid political, economic and social transformations that took place after 1991 had considerable negative impacts on water management, including already initiated as well as planned construction projects. The functioning of the institutions responsible for water management was affected, too. In agriculture, this led to a rapid and significant deterioration of irrigation infrastructure and a considerable decrease in productivity (Figure 1). Similar problems arose in relation to hydropower, drinking water supply, and sanitation. The shortage of energy led to an energy crisis with frequent power cuts in Tajikistan and Kyrgyzstan, resulting in considerable economic losses. In Tajikistan alone, the winter of 2007/08 saw damage and general loss of revenues estimated at USD 850 million (Rabejanova 2008). Economic losses have also occurred due to the reduction of cultivated irrigated land. In Kyrgyzstan this decrease was almost 13% between 1994 and 1999 (Schaap et al 2004). This heavily affected the country's overall economy and hence the living conditions of the population. In Tajikistan the civil war of 1992–1997 further aggravated the situation.

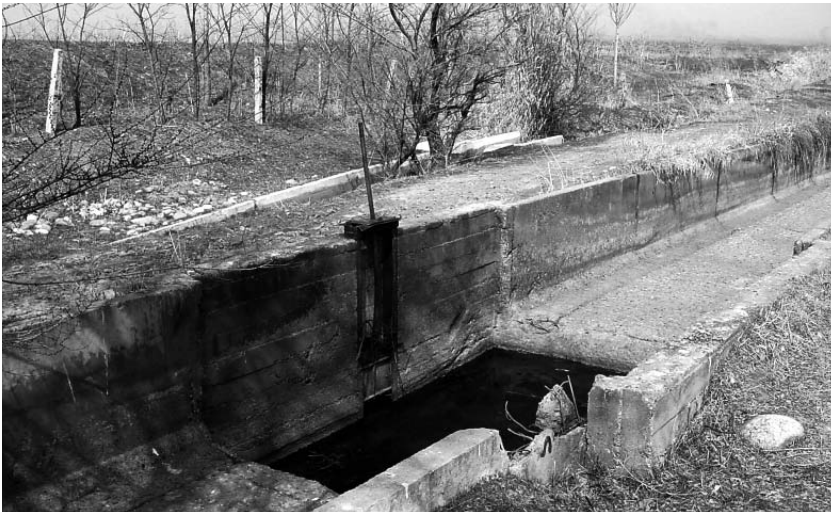


Fig. 1  
Widespread broken water distribution devices hinder effective water management in the Chuy Valley. (Photo by Daniel Maselli, Sokuluk Rayon, 21 March 2003)

The dissolving of the *kolkhozes* and *sovkhazes*, combined with land reforms, led to the establishment of many small private farms in Kyrgyzstan and created both winners and losers (Shigaeva et al 2007). The fragmentation of large-scale production units had a deep impact on needs and requirements related to irrigation. The previous large-scale infrastructure was especially designed to provide water in accordance with determined crop norms on large areas up to 7000 ha. This system is no longer appropriate for many small-scale farmers and the diverse agricultural production in which they engage on plots of only 0.1 to 5 ha. While some agricultural fields receive too much water, others remain dry or receive water at too infrequent intervals. In this situation, both the previous technical irrigation infrastructure and the related Soviet water management system became obsolete (Spoor 1995). In Tajikistan, the dilapidation of the national electricity grid forced people to seek alternatives – cutting timber or using remnant forests, sparse trees, and wild bushes such as *teresken*. Wherever possible, micro-hydropower stations were constructed using any spare parts from previous mechanical installations (Hoeck et al 2007).

Since 1991 the governments of Central Asian countries have scaled down the agencies that formerly controlled irrigation and drainage infrastructure. Expenditures for operation and management in Kazakhstan dropped by a factor of 21 during the 1990s and only 31% of the required maintenance in the Kyrgyz Republic received funding (Bucknall et al 2003). The figures are similar for Tajikistan (UNDP 2003). The rapid and dramatic deterioration of infrastructure and services after independence raised questions about future institutional responsibility for rehabilitation and about payment for water and water delivery services (Schaap et al 2004; Herrfahrtdt et al 2006). The costs for rehabilitation of on-farm irrigation network operation systems were estimated at USD 100 per ha in 2000 (Wegerich 2000) and are likely to be higher now. As elsewhere, one of the key problems in the sustainable management of scarce water is the unavailability of reliable data on water supply and withdrawals and their seasonal fluctuations. During the Soviet era a well-developed hydro-meteorological measuring and monitoring system was established which later collapsed, leaving water users and water management bodies without up-to-date information.

#### 14.1.4 Managing the new situation

The international community – in particular the World Bank (WB), the Asian Development Bank (ADB) and the United Nations Development Programme (UNDP) – reacted by promoting policies of decentralisation and democratisation. At farm and household level, two types of problems appeared: a technical one due to the mismatch in infrastructure, and a managerial one related to lack of experience. Many household heads were forced to become farmers in order to secure family subsistence, whereas their previous professional activity had had nothing to do with agriculture. Inappropriate use of water due to a misconception (“the more, the better”) caused salinisation and waterlogging, leading to reduced soil fertility and reduced agricultural productivity.

One adaptive reaction promoted by the most important international actors was the establishment of Water Users’ Associations (WUAs). This form of organisation among household farms was meant to enable better distribution of water resources at the plot level. In Kyrgyzstan, in 2000 WUAs already managed about one quarter of the total irrigated area, amounting to 232,800 ha. In 2003, 300 additional WUAs raised this figure to 450,000 ha, amounting to about 40% of the total irrigated area (Schaap et al 2004). The reasons for creating a WUA appear to be rather diverse, ranging from the expectation of obtaining infrastructural improvement and equipment to the hope of solving immediate irrigation needs; meanwhile, specific training is being provided by external actors (Johnson and Stoutjesdijk 2008). At the national level, governments also tried to respond (see section 14.3.1 below). The Kyrgyz Government has taken further action to address poverty, especially in rural areas, by starting to implement the second phase of the “Water and Land Reform” programme, which aims to stabilise the economy and increase living standards (Herrfahrdt et al 2006). Bilateral donors such as the Swiss Agency for Development and Cooperation (SDC) tried to respond to needs with a water strategy and development projects (“Integrated Water Resources Management in the Ferghana Valley”, see Krähenbühl et al 2002). However, not all of these reform efforts have yielded the expected results, as widespread corruption hampers effective support, especially for the poorest. Access to the most productive land and to sufficient water often remains a privilege for those who have good relationships with the responsible authorities as well as political influence.

## **14.2 State of research and methodological approach**

### **14.2.1 Current status**

At the country level, more recent research on water management in Central Asia has focused mainly on institutional aspects (e.g. Micklin 2000; Ul Hasan et al 2004), while bio-physical baseline conditions and technical aspects are frequently neglected. A similar situation occurs in development, where bio-physical aspects are also often not taken into consideration, as in the World Bank's "On-Farm Irrigation" project. More efforts are being made to gain a better understanding of climate change and its possible impacts on water in Central Asia (IPCC 2007; Perelet 2007) and to address transboundary water management issues (Moerlins et al 2008). In general, issues related to water are receiving increased attention at the global level, e.g. in the Human Development Report 2006, which is devoted to the global water crisis (UNDP 2006), and the 5<sup>th</sup> World Water Forum in Istanbul (March 2009).

### **14.2.2 General set-up and 'one watershed approach'**

Research on water management in Central Asia carried out within the framework of the Swiss National Centre of Competence in Research (NCCR) North-South programme addressed three main questions: How is water used and managed, and where are the technical, socio-economic, institutional and legal bottlenecks? How does climate change impact on river flow and agriculture? How do livelihood strategies impact on natural resource use and management? For strategic reasons, five PhD and nine MSc studies were concentrated in one watershed (Sokuluk River) in Kyrgyzstan, in order to take advantage of synergies and facilitate collective coaching and collaboration. The five PhD studies were conducted by Natalya Ershova on river flow and climate change; Bakyt Askaraliev on water use and management; Justus Gallati on participatory system dynamics; Jyldyz Shigaeva on livelihood strategies and the environment; and Asel Ibraimova on social mobilisation and the legal framework. These studies were complemented by additional PhD-level studies on governance and conflicts in water use in southern Kyrgyzstan, by Christine Bichsel; on land-use change and degradation in western Tajikistan, by Bettina Wolfgramm and Gulniso Nekushoeva; and on the role of knowledge generation in the Tajik Pamirs, by Thomas Breu (see also Breu et al 2005).<sup>7</sup>

### **14.3 Changes and the dynamics of change after independence**

The studies elucidated the tremendous bio-physical, political and socio-economic changes that have taken place, as well as their implications for natural resource management in the region, especially with respect to water use and management. Analysis of coping strategies to mitigate changes at the local level revealed that ensuring minimal access to land and irrigation water for the poor is imperative in addressing rural poverty. Obviously, natural resources and people's livelihoods are not only threatened by socio-economic upheaval, but also affected by environmental dynamics such as climate change. Continued and increasing glacier melting in recent years has impacts on the amount and the timing of river flow. Evidence suggests that it is not the increased quantity of water, but rather the river flow peak shifting forward by one month that may cause problems for livelihoods. This shift will have particularly negative impacts on the entire irrigation system, possibly leading to a lack of water during the period of maximum water consumption, which coincides with the dry summer season.

#### **14.3.1 Political, legal and socio-economic transformation**

In order to better manage water following independence, a range of new legal documents were elaborated and approved. The most relevant in Kyrgyzstan are the Law on Water (1995), the Law on Water Users' Associations (2002), and the Water Code (2005). This should help to achieve the ADB goal of establishing 500 WUAs by 2010. Similar efforts were undertaken in Tajikistan, where a new Water Code was approved in 2003 as an outcome of the International Year of Water 2003.

The major economic change at the national level is related to the pricing of irrigation water for farmers. Even though prices per cubic metre are low, payments are not made regularly (Gallati 2008). At the regional level, the major challenge is to accommodate competing transboundary demands for water to be used for energy and agriculture. While Kyrgyzstan and Tajikistan as the 'water towers' of Central Asia depend heavily on revenues from hydro-power production in winter, Uzbekistan and Kazakhstan expect water to be released – free of charge – mainly during the growing season from spring to autumn.



Fig. 2  
Self-made low-tech  
waterwheel in the  
Ferghana Valley  
used to illegally  
extract water from  
a channel in order  
to irrigate a home  
garden. (Photo by  
Daniel Maselli,  
Batken Oblast,  
5 May 2004)

Analysis of the rationale of three development projects aiming to transform inter-community water conflicts along the newly established borders in the Ferghana Valley between 1999 and 2005 showed that water scarcity and ethnic differences are historically, culturally and politically constructed, institutionally embedded, and shaped by power relations. Violence that develops locally is often characterised by multiple interdependencies reaching beyond the boundaries of communities, concealing wider political interests and power relations. Addressing such water conflicts as mere technical or relational issues, and proposing infrastructural solutions or more intensive exchange processes, will therefore fail (Figure 2). Successful mitigation of water conflicts must include multiple dimensions and acknowledge the parties' moral and reflective capacities. It requires critical reflection on the assumptions and choices that underlie both the changes proposed and the aims of conflict mitigation. Overly normative and value-laden models transposed from differing social contexts appear not only to be questionable in terms of their ethnocentrism but may ultimately fail to lead to the desired empowerment and change (Bichsel 2005, 2006, 2009).

### 14.3.2 Impacts on institutions

Existing legislation should recognise and guarantee collective rights to rural communities and help to implement the subsidiary principle. However, in practice, in Kyrgyzstan the legal and institutional framework does not pro-



vide favourable conditions due to lack of adequate financial and institutional support to local communities (Ibraimova 2009). At present, rural communities seldom exercise their collective rights, for three main reasons. First, the Kyrgyz state has Soviet-style top-down law-making processes without participatory mechanisms involving rural communities; hence the existing legal and institutional framework is ‘empowering’ only from a governmental perspective. Second, there are no effective state incentives to enforce the proposed institutions and organisations at the rural level; bodies prescribed by law exist only on paper unless financial and/or institutional support is provided, either by international donors or successful community members. Third, traditional practices for collective actions in rural areas are not taken into account by government, while new organisations for collective action remain ineffective. However, social mobilisation is an important prerequisite for ‘Participatory Irrigation Management’ in Central Asia (Ul Hassan et al 2004; Dukhovny and Sokolov 2005).

### **14.3.3 Climate change – the invisible curse of the future?**

Temperature and precipitation data over the past 60 years show a general decreasing trend for precipitation, while the average temperature is increasing (Galkina 2005). Analysis of glacier wastage in the Sokuluk catchment over the last 40 years (Niederer et al 2008) shows a clear trend in glacier retreat between 1963 and 2000. Both the areal loss of 28% observed for the 1963–2000 period and a clear acceleration of wastage since the 1980s correlate with the results of studies in other regions of the Tien-Shan and the Alps (Paul et al 2004). In particular, glaciers smaller than 0.5 km<sup>2</sup> have exhibited this phenomenon most starkly. While they registered a medium decrease of only 9.1% for 1963–1986, they lost 41.5% of their surface area between 1986 and 2000.

Analysis of river flow data for the Sokuluk River indicates a clear increase in recent decades, particularly during the warm summer months. Discharge in July increased by about 4 m<sup>3</sup>/s between 1960 and 2000. Annual river flow increased on average by 1.3 m<sup>3</sup>/s, which corresponds to about 24% of the average annual discharge of 5.33 m<sup>3</sup>/s (Galkina 2005).

Considering the composition of river flow, this confirms the link between temperature increase and glacier melting, which results in temporarily higher river flow and water discharge. The water balance of the Sokuluk catchment shows that more than 33% of precipitation is lost to evapotranspiration,

while about 39% of total runoff is generated by snowmelt and 17% by ice melt. Annual precipitation has fluctuated considerably since 1915, making prognosis rather difficult. However, since average annual temperature and average runoff have increased, the sustainability of water discharge is highly unpredictable and becoming increasingly problematic.

River flow modelling further reveals a possible increase in peak flow, causing potential hazards such as mudflows, storm waters, and floods. Moreover, the expected forward shift in the peak flow from July to June – and thus earlier melting of water resources important for irrigation – may either be a blessing for early agricultural production or create a problem for late summer cultivation.

#### **14.3.4 Infrastructural changes**

De-collectivisation of state farms has led to a sharp increase in water users in the Sokuluk catchment since 1991. This proliferation complicates water allocation and distribution, a problem that is further aggravated by the fact that distribution channels are often dilapidated (Askaraliev and Ivanova 2006). In the Sokuluk Rayon – which has the largest irrigated agricultural surface (56,600 ha) – 60% of the 965.9 km of earth channels and 55% of the 422.9 km of concrete channels are in bad condition. Only 23% of the initially abstracted water currently reaches its final destination (Askaraliev 2006). Losses are also caused by the many earth channels where water infiltrates. In five villages located in the foothill zone of the Sokuluk catchment (Toshbulak, Saz, Asylbash, Krupski, and Sokuluk), less than 9 km of the 97.7 km of channels are made of concrete, i.e. less than 10%, whereas the national average is 25%.

In principle, while the amount of water available would be sufficient to cover local needs – provided water is appropriately managed through adapted small-scale technologies – at present only 65% of the land is being irrigated. So far most of the planning, monitoring and payment mechanisms elaborated during Soviet times are still being applied, although they are outdated and inadequate (Froeblich et al 2007). This gives rise to tensions and conflicts between users and the authorities in charge. The willingness of farmers to pay for water depends on the quality of services provided, in particular the amount and timing of water delivery (Gallati et al 2006). The lack of a water discharge accounting system hinders more effective management. Therefore, a newly improved device for stabilising and measuring water discharge for different channel categories was developed by Bakyt Askaraliev and patented in 2008.



## **14.4 Implications, responses and outlook**

### **14.4.1 Policies, institutions and economics**

These research results emphasise the importance of institutions and policies in shaping future human–nature interfaces in order to address rapid change more effectively. They demonstrate how social, political and cultural institutions mediate the relations between humans and the environment, giving rise to conflicts as well as offering opportunities (Giese and Sehring 2007; Wegerich 2008). In future, more attention should be paid to gender aspects in integrated water resource management (GWP 2006) as well as to regional cooperation. This is a prerequisite to achieving sustainable management of the Amudarya and Syrdarya rivers, which constitute the two lifelines of the entire region (UNDP 2005).

The obvious economic damage due to inappropriate and ineffective water management, both in agriculture and in hydropower, need to be addressed too. The processes of climate change that are already tangible are likely to further aggravate the situation (IPCC 2007). There is thus an urgent need for effective laws and adaptive strategies, from livelihood to regional levels, to help share responsibility (UNESCO 2006). This will require participatory approaches to secure the ownership of farmers, who are the future key managers and custodians of water resources in Central Asia (Dukhovny and Sokolov 2005). Forgotten or neglected traditional soil and water conservation (SWC) technologies may play a crucial role here.

### **14.4.2 Livelihoods and ecology**

Since independence, people have developed different strategies to cope with change (Shigaeva et al 2007). The ‘accumulation strategy’ applied by wealthy households, which rent or buy additional agricultural land, plays an important role in water management. Short-term profit orientation often hampers sustainable land and water management. This attitude needs to be addressed through appropriate and enforced regulations. Pricing water for agriculture based on consumption is a necessary measure to reduce water consumption and increase the effectiveness of irrigated agriculture. Special attention should be paid to both environmental and health risks related to irrigation, such as salinisation, waterlogging, or the spread of malaria in connection with climate and land-use change (Rebholz et al 2006).

### **14.4.3 Challenges for development and research**

Already visible climate change – and, to an even greater extent, predicted climate change in Central Asia – calls for early reflection about possible mitigation strategies to avoid or reduce further negative effects. A major challenge will be to find ways of coping with predicted reductions in (annual) rainfall and increases in (summer) temperature. This may entail the construction of cheap but effective small-scale water retention devices using local construction materials and requiring little or no external technical support. Development actors are thus challenged to reflect more on how to support the required adaptation of smallholders rather than favour water-intensive large-scale agriculture. More support will be required to increase knowledge regarding appropriate irrigation – in particular, the amount and timing of water – to avoid wasting water or causing environmental damage. Here, innovative forms of information sharing are called for; a multi-level multi-stakeholder-based ‘water management information system’ could be helpful. At a meso-scale, support for participatory integrated water resource management at watershed level could be a promising future pathway. Here, development-oriented research should put greater emphasis on involving end-users as the real future managers of water in particular and natural resources in general.

## Endnotes

### Full citation for this article:

Maselli D, Arynova N, Ershova N, Ivanova N, Bilenko V, Liniger HP. 2010. Managing water in a dynamic setting: The challenges of change in Central Asia. *In: Hurni H, Wiesmann U, editors; with an international group of co-editors. Global Change and Sustainable Development: A Synthesis of Regional Experiences from Research Partnerships*. Perspectives of the Swiss National Centre of Competence in Research (NCCR) North-South, University of Bern, Vol. 5. Bern, Switzerland: Geographica Bernensia, pp 223–239.

### Acknowledgements:

The authors acknowledge the contributions of the following individuals, listed here in alphabetical order: Bakyt Askaraliev, Christine Bichsel, Roman Droux, Maria Galkina, Justus Gallati, Tobias Hoeck, Ivan Klepachev, Evgenia Korobitsina, and Peter Niederer. Most studies were carried out in partnership with local academic and research institutions. Special thanks go to the Kyrgyz-Russian Slavic University (Bishkek), the Kyrgyz Agrarian University (Bishkek), the Institute of Water Problems (Tashkent), and the Tajik Soil Science Research Institute (Dushanbe). Core support for this research came from the Swiss National Centre of Competence in Research (NCCR) North-South: Research Partnerships for Mitigating Syndromes of Global Change, co-funded by the Swiss National Science Foundation (SNSF), the Swiss Agency for Development and Cooperation (SDC), and the participating institutions.

<sup>1</sup> Daniel Maselli is Senior Research Scientist at the Centre for Development and Environment (CDE), University of Bern, Switzerland, and Associate Senior Research Fellow at the University of Central Asia (UCA) in Bishkek, Kyrgyzstan. His main field of expertise is natural resource use in semi-arid mountain regions with a particular focus on transhumance and sustainable pasture management. He recently joined the Swiss Agency for Development and Cooperation (SDC).  
E-mail: daniel.maselli@ucentralasia.org, daniel.maselli@deza.admin.ch

<sup>2</sup> Nazgulmira Arynova is Regional Coordinator of the Swiss National Centre of Competence in Research (NCCR) North-South in Central Asia. She holds an MSc degree in Land Reclamation from the Kyrgyz State Agrarian Institute and has recently started her PhD research on water management in the intensive agricultural zone of the Chui Valley in Kyrgyzstan. Her main fields of interest are integrated water management and land use. Mira Arynova contributed substantially to this article and can be regarded as co-main author together with Daniel Maselli.  
E-mail: mira.arynova@ucentralasia.org

<sup>3</sup> Natalya Ershova is Associate Professor at the Kyrgyz-Russian Slavic University in Bishkek, Kyrgyzstan. Her main research foci are climatology and hydrology, with a special emphasis on the impact of climate and land-use change on river flow in mountain zones.  
E-mail: natasha-er@yandex.ru

<sup>4</sup> Natalya Ivanova is Associate Professor at the Kyrgyz-Russian Slavic University in Bishkek, Kyrgyzstan. Her main research focus is on efficient water management in irrigation systems, including technological and technical aspects. She has a specific interest in water distribution, field irrigation, and irrigation regimes for agricultural crops.  
E-mail: n.ivanova@istc.kg

<sup>5</sup> Viktor Bilenko is Associate Professor at the Ryazan Branch of Moscow State Open University in Ryazan, Russia. His main research interests are water management and climate change disaster risk management.  
E-mail: bilenko-v@yandex.ru

<sup>6</sup>Hanspeter Liniger is Senior Research Scientist at the Centre for Development and Environment (CDE), University of Bern, Switzerland. He is Coordinator of the World Overview of Conservation Approaches and Technologies (WOCAT) and has specialised on sustainable land and water management.

E-mail: [hanspeter.liniger@cde.unibe.ch](mailto:hanspeter.liniger@cde.unibe.ch)

<sup>7</sup>The PhD dissertations referred to in this paragraph are not included in the list of references unless they are referred to elsewhere in this article. However, many of them are available at: <http://www.north-south.unibe.ch/content.php/filterpage/id/27>. Moreover, this article refers to other publications by these authors that are based on their PhD studies.

## References

Publications elaborated within the framework of NCCR North-South research are indicated by an asterisk (\*).

- \* Askaraliev B. 2006. Analysis of the effectiveness of water use in the irrigation system of the Sokuluk River Basin, Chui Valley, Kyrgyzstan [in Russian]. *Kyrgyz Agricultural University Bulletin* 1(4):78–82.
- \* Askaraliev B, Ivanova N. 2006. Analysis of the technical condition of irrigation systems of the Sokuluk River Basin [in Russian]. *Kyrgyz Agricultural University Bulletin* 1(7):112–114.
- \* Bichsel C. 2005. In search of harmony: Repairing infrastructure and social relations in the Ferghana valley. *Central Asian Survey* 24(1):53–66.
- \* Bichsel C. 2006. *Dangerous Divisions: Irrigation Disputes and Conflict Transformation in the Ferghana Valley* [PhD dissertation]. Bern, Switzerland: University of Bern.
- \* Bichsel C. 2009. *Conflict Transformation in Central Asia: Irrigation Disputes in the Ferghana Valley*. Central Asian Studies Series. London, UK: Routledge.
- Bilik OA. 1990. *Irrigation of Kyrgyzstan in Projects and Objects* [in Russian]. Bishkek, Kyrgyzstan: Kyrgyzstan.
- \* Breu T, Maselli D, Hurni H. 2005. Knowledge for sustainable development in the Tajik Pamir Mountains. *Mountain Research and Development* 25(2):139–146.
- Bucknall J, Klytchnikova I, Lampietti J, Lundell M, Scatasta M, Thurman M. 2003. *Irrigation in Central Asia: Social, Economic and Environmental Considerations*. New York: The World Bank, Europe and Central Asia Region Environmentally and Socially Sustainable Development.
- Dukhovny VA, Sokolov VI. 2005. *Integrated Water Resources Management: Experience and Lessons Learned from Central Asia towards the Fourth World Water Forum* [in Russian]. Tashkent, Uzbekistan: Interstate Coordination Water Commission (ICWC) in Central Asia.
- Froebrich J, Bos MG, Wegerich K, editors. 2007. *Emerging Issues on Land and Water in Central Asia*. Special issue. *Irrigation and Drainage Systems* 21(3–4). Also available at: <http://www.springerlink.com/content/0168-6291>; accessed on 10 June 2009.
- \* Galkina M. 2005. *The Impact of Glacier Dynamics on River Flow on the Northern Slope of the Kyrgyz Range (NSKR)* [MSc thesis]. Bishkek, Kyrgyzstan: Kyrgyz-Russian Slavic University.
- \* Gallati J. 2008. *Towards an Improved Understanding of Collective Irrigation Management: A System Dynamics Approach* [PhD dissertation]. Bern, Switzerland: University of Bern.
- \* Gallati J, Askaraliev B, Niederer P, Maselli D. 2006. Towards a system dynamics framework for understanding interactions of head- and tail-users in irrigation systems in Kyrgyzstan. In: *Proceedings of the 24<sup>th</sup> International Conference of the System Dynamics Society, Nijmegen, 23–27 July 2006*. Nijmegen, The Netherlands and Albany, NY: Methodology Department, Nijmegen School of Management, Radboud University Nijmegen, and The System Dynamics Society, University at Albany. Also available at: <http://www.systemdynamics.org/conferences/2006/proceed/index.htm>; accessed on 10 July 2009.
- Giese E, Sehring J. 2007. Konflikte ums Wasser – Nutzungskonkurrenz in Zentralasien. *Osteuropa* 57(8–9):483–495.
- GWP [Global Water Partnership]. 2006. *Gender Aspects of Integrated Water Resources Management. Report on Gender Surveys in Representative Households in Azerbaijan, Armenia, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan*. Tashkent, Uzbekistan: Global Water Partnership Secretariat for Central Asia and Caucasus.
- Herrfahrdt E, Kipping M, Pickardt T, Polak M, Rohrer C, Wolff CF. 2006. *Water Governance in the Kyrgyz Agricultural Sector: On Its Way to Integrated Water Resource Management?* DIE Studies No. 14. Bonn, Germany: German Development Institute (DIE).

- \* Hoeck T, Droux R, Breu T, Hurni H, Maselli D. 2007. Rural energy consumption and land degradation in a post soviet setting: An example from the West Pamir Mountains in Tajikistan. *Energy for Sustainable Development* 11(1):48–57.
- \* Ibraimova A. 2009. *Legal and Institutional Framework for Empowerment of Rural Communities in the Kyrgyz Republic*. Etudes et Colloques 53. Fribourg, Switzerland: Publications of the Institute of Federalism.
- IPCC [Intergovernmental Panel on Climate Change]. 2007. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge University Press.
- Johnson III SH, Stoutjesdijk J. 2008. WUA training and support in the Kyrgyz Republic. *Irrigation and Drainage* 57(3):311–321.
- Krähenbühl J, Gely J, Herren U. 2002. *Swiss Water Strategy for Central Asia 2002–2006*. Bern, Switzerland: Swiss Agency for Development and Cooperation (SDC) and Swiss State Secretariat for Economic Affairs (SECO).
- Mamatkanov DM. 2000. Water and energy problems in Kyrgyzstan [in Russian]. *Science and New Technologies* 4:75–76.
- Mamatkanov DM, Bazhanova LV, Romanovsky VV. 2006. *Present-day Water Resources of Kyrgyzstan* [in Russian]. Bishkek, Kyrgyzstan: Ilim.
- Martius C, Lamers JPA, Vlek PLG, Eshchanov R, Rudenko I, Salaev O. 2005. Water, salt, cotton and soums: Shedding new light on the Aral Sea problem. *Tropentag 2005. The Global Food and Product Chain: Dynamics, Innovations, Conflicts, Strategies*. University of Hohenheim, Stuttgart-Hohenheim, Germany, 11–13 October 2005. *Conference Proceedings*. <http://www.tropentag.de/2005/abstracts/full/172.pdf>; accessed on 14 July 2009.
- Micklin P. 2000. *Managing Water in Central Asia: Central Asian and Caucasian Prospects*. London, UK: The Royal Institute of International Affairs.
- Moerlins JE, Khankhasayev MK, Leitmann SF, Makhmudov EJ, editors. 2008. *Transboundary Water Resources: A Foundation for Regional Stability in Central Asia. Proceedings of the NATO Advanced Research Workshop on Facilitating Regional Security in Central Asia through Improved Management of Transboundary Water Basin Resources, Almaty, Kazakhstan, 20–22 June 2006*. Dordrecht, The Netherlands: Springer.
- Molden D, de Fraiture C. 2004. *Investing in Water for Food, Ecosystems and Livelihoods: Blue Paper, Stockholm 2004*. Discussion Draft for Comprehensive Assessment of Water Management in Agriculture. Colombo, Sri Lanka: Consultative Group on International Agricultural Research (CGIAR) and International Water Management Institute (IWMI). Also available at: <http://www.iwmi.cgiar.org/Assessment/files/pdf/BluePaper.pdf>; accessed on 10 June 2009.
- \* Niederer P, Bilenko V, Ershova N, Hurni H, Yerokhin S, Maselli D. 2008. Tracing glacier wastage in the Northern Tien Shan (Kyrgyzstan/Central Asia) over the last 40 years. *Climatic Change* 86:227–234.
- Pala C. 2005. To save a vanishing sea. *Science* 307(5712):1032–1034.
- Paul F, Käab A, Maisch M, Kellenberger T, Haerberli W. 2004. Rapid disintegration of Alpine glaciers observed with satellite data. *Geophysical Research Letters* 31:L21402. doi:10.1029/2004GL020816.
- Perelet R. 2007. Central Asia: Background paper on climate change. *Human Development Report 2007/2008. Fighting Climate Change: Human Solidarity in a Divided World*. New York, NY: United Nations Development Programme (UNDP).
- Rabejanova M. 2008. The Tajik energy crisis. Special Report. *Peace and Conflict Monitor*. Ciudad Colón, Costa Rica: University for Peace. Also available at: [http://www.monitor.ucepeace.org/archive.cfm?id\\_article=492](http://www.monitor.ucepeace.org/archive.cfm?id_article=492); accessed on 11 November 2008.
- \* Rebolz C, Michel A, Maselli D, Saipphudin K, Wyss K. 2006. Frequency of malaria and glucose-6-phosphate dehydrogenase deficiency in Tajikistan. *Malaria Journal* 5(1):51.
- Schaap O, Pavey J, Kirby A. 2004. *Privatization/Transfer of Irrigation Management in Central Asia*. Final Report. London, UK: Department for International Development (DFID). Also available at: <http://www.research4development.info/PDF/Outputs/R8025.pdf>; accessed on 10 June 2009.

- \* Shigaeva J, Kollmair M, Niederer P, Maselli D. 2007. Livelihoods in transition: Changing land use strategies and ecological implications in a post-Soviet setting (Kyrgyzstan). *Central Asian Survey* 26(3):389–406.
- Sobolin GV. 1990. *Land and Water Resources: Conditions of Decreased Irrigated Land and Irrigating Systems* [in Russian]. Bishkek, Kyrgyzstan: Kyrgyz Economy Research Institute.
- Spoor M. 1995. Agrarian transition in former soviet Central Asia: A comparative study of Kyrgyzstan and Uzbekistan. *The Journal of Peasant Studies* 23(1):46–63.
- Ul Hassan M, Starkloff R, Nizamedinkhodjaeva N. 2004. *Inadequacies in the Water Reforms in the Kyrgyz Republic: An Institutional Analysis*. Research Report No. 81. Colombo, Sri Lanka: International Water Management Institute (IWMI).
- UNDP [United Nations Development Programme]. 2003. *Tapping the Potential: Improving Water Management in Tajikistan. National Human Development Report 2003*. Dushanbe, Tajikistan: UNDP.
- UNDP [United Nations Development Programme]. 2005. *Bringing Down Barriers: Regional Cooperation for Human Development and Human Security. Central Asia Human Development Report*. Bratislava, Slovakia: UNDP Regional Bureau for Europe and the Commonwealth of Independent States.
- UNDP [United Nations Development Programme]. 2006. *Beyond Scarcity: Power, Poverty and the Global Water Crisis. Human Development Report 2006*. New York: UNDP.
- UNEP/GRID [United Nations Environment Programme/Global Resource Information Database]. 2000. *State of the Environment in Tajikistan Report*. <http://enrin.grida.no/htmls/tadjik/soe2/eng/index.htm>; accessed on 10 June 2009.
- UNEP/GRID [United Nations Environment Programme/Global Resource Information Database]. 2002. Water Resources. *National Electronic Report. Environment State of Kyrgyz Republic*. <http://enrin.grida.no/htmls/kyrgyz/soe2/english/waterf.htm>; accessed on 26 May 2008.
- UNESCO [United Nations Educational, Scientific and Cultural Organization]. 2006. *Water: A Shared Responsibility. The United Nations World Water Development Report No. 2*. Paris, France: UN Water.
- Vinogradov S, Langford VPE. 2001. Managing transboundary water resources in the Aral Sea Basin: In search of a solution. *International Journal of Global Environmental Issues* 1(3–4):345–362.
- Wegerich K. 2000. *Water User Associations in Uzbekistan and Kyrgyzstan: Study on Conditions for Sustainable Development*. Occasional Paper No. 32. London, UK: University of London, School of Oriental and African Studies (SOAS).
- Wegerich K. 2008. Hydro-hegemony in the Amu Darya Basin. *Water Policy* 10(2):71–88.





## 15 Kyrgyz and Tajik Land Use in Transition: Challenges, Responses and Opportunities

Bettina Wolfgramm<sup>1</sup>, Jyldyz Shigaeva<sup>2</sup>, Gulniso Nekushoeva<sup>3</sup>, Bassirou Bonfoh<sup>4</sup>, Thomas Breu<sup>5</sup>, Hanspeter Liniger<sup>6</sup>, and Daniel Maselli<sup>7</sup>

### Abstract

Based on studies conducted in Kyrgyzstan and Tajikistan, land use in transition was assessed with regard to historical background, implications for livelihoods, the current state of natural resources, and opportunities for sustainable land management. The overall aim of this research was to improve the basis for decision-making in sustainable land management. Methodologically, a need for new approaches and methods well adapted to the changing agricultural sector in the Central Asian context was identified, and studies conducted were analysed for lessons to be learned. Thematically, it can be concluded that political and socio-economic transition created a highly challenging situation for farmers, initially forcing many of them into land-use practices that led to land degradation. However, studies in Tajikistan clearly revealed the existence of opportunities for improving land management, which include (i) fruit, cereal and fodder plots, (ii) large-area conservation systems implemented in Soviet times, and (iii) agronomic conservation measures on cropland. Finally, it was concluded that insufficient knowledge had been gathered so far, especially on pasture management.

**Keywords:** Land use; transition; land degradation; sustainable land management (SLM); SLM opportunities; impact assessment; Kyrgyzstan; Tajikistan.

## **15.1 Introduction**

### **15.1.1 Challenges: triggers of land-use change**

The transition period after the collapse of the Soviet Union in 1991 led to a deep economic and social crisis that called for immediate measures. One such measure was the land reform process initiated directly after the Central Asian states achieved independence. It was expected to improve the efficiency and productivity of agriculture (Nissen 2004). However, decisions on land reform often taken in an ad hoc manner led to unequal access to land (Dudwick et al 2003), leaving many rural households with small rainfed plots on steep slopes. Food insecurity caused an emergency situation, and subsequently such marginal areas were cultivated without application of conservation measures. Large areas of grazing land remain common property, but they lack management and are thus frequently overstocked (Ludi 2003). In Kyrgyzstan, pasture use is strictly regulated in theory. In practice, responsibilities at different administrative levels often overlap, creating management conflicts. Furthermore, breakdown of infrastructure has in particular limited farmers' possibilities and willingness to move to remote summer pastures, adding pressure on common pasture resources in the vicinity of villages. Overall, all these land-use changes have resulted in degradation of land resources (see section 15.3.1). In recent years, labour migration has often led to the abandonment of degraded cropland and agricultural activities as a whole.

Thus, the political and socio-economic transformation that took place after the breakdown of the Soviet Union triggered a series of sudden land-use changes in Central Asia (Jones 2004). Together with changes in land tenure, this has affected not only land resources, but also the livelihoods of people as well as their livestock (Dudwick et al 2003). Accordingly, a range of ecological, socio-economic, institutional, legal and political changes can be observed which can be considered as both opportunities and threats for the future development of the region. In particular, land management may help to prevent, mitigate and reverse the degradation of natural resources or, on the contrary, trigger or accelerate degradation (Liniger and Critchley 2007). Despite the ongoing transformations, information on the state of land resources has scarcely been updated since independence in 1991, and in most areas statistical data and maps are outdated or inappropriate for land-use planning in this new context.

### **15.1.2 General set-up, overall aim and research questions**

This synthesis is based on the analysis of studies conducted in different regions of Central Asia, including studies on the Sokuluk and Naryn river basins in Kyrgyzstan, the Tajik Pamirs and the hills of central Tajikistan, within the framework of the Swiss National Centre of Competence in Research (NCCR) North-South programme. The overall aim of the research conducted was to improve the basis for decision-making and for more effective interventions to achieve sustainable land management (SLM) in Central Asia. Thematically, the research questions at hand were the following: (1) What triggered land-use changes, and what were the main implications for livelihoods? (2) How did land-use changes affect natural resources, and what is the present state of natural resources? (3) What opportunities exist for SLM? The implicit methodological goal of the studies was to introduce and integrate different new approaches to land resource assessment in Central Asia. These included efficient methods for spatially explicit analysis, such as soil spectrometry for digital soil mapping (Shepherd and Walsh 2002) and fuzzy logic-based risk modelling, as well as interdisciplinary and transdisciplinary approaches such as livelihood and multi-level stakeholder approaches (Hurni 2000) and the WOCAT<sup>8</sup> methodology (Liniger and Critchley 2007).

## **15.2 Methods: assessing land degradation and conservation**

In this section it is first argued that there is a need to apply new and more efficient methodologies for assessing land degradation and conservation in order to suit the context of the changing agricultural sector in Central Asia, including transformations in government institutions concerned with land management. This is followed by a brief presentation of the methodological approach using four examples of studies conducted at various spatial scales.

### **15.2.1 Adapting to new land management requirements**

During the era of planned economy, central top-down management authorities prepared basic materials for land-use planning, decided on land use (Bloch 2002), and deployed specific conservation measures to state-farm managers. Since the breakdown of the Soviet Union most rural families have gone back to subsistence agriculture, and land is now privately used. How-

ever, rural households have limited physical, financial and human resources, while depending heavily on the output of their land. With the stakeholders, the land management units and the available physical and financial resources changing, there is a need to adapt research approaches to new land management requirements, particularly with a view to introducing new and more efficient methods. In addition, the overall research goal has changed, as well. While in Soviet times land surveying (e.g. geobotanical and soil surveying) was dominated by a focus on agricultural production, the focus has now shifted towards SLM since the Central Asian countries have signed international conventions. SLM requires balancing ecological, economic and socio-cultural sustainability, and thus calls for inter- and transdisciplinary research approaches. Joint efforts must be made by scientists and various stakeholder groups to adapt and develop more cost-effective monitoring systems, including indicators, measures, and procedures adjusted to the farmers' needs and means.

### **15.2.2 Four studies, four spatial scales and specific approaches**

The first study presented here focused on the communal level in Kyrgyzstan (Figure 1) and was conducted by Shigaeva et al (2007). The aim was to analyse qualitative and quantitative changes over time in the ecology and productivity of pasture resources, and subsequently to analyse the links between the status of land resources and corresponding household strategies. Use of a standardised procedure from the Soviet era for detailed geobotanical pasture assessment (Kyrgyz Giprozem 1987) facilitated comparison of new with previous data. Household strategies were appraised using interviews based on the Sustainable Livelihood Framework (DFID 2000); this allowed for examination of how peasant farms emerging from the privatisation process reacted to the changes in their institutional and social environment.

Two studies were conducted in the loess hills of central Tajikistan (Figure 1); one was conducted at the plot level and used comparative case studies in order to assess in detail the impact of conservation measures on soil resources (Akhmadov and Nekushoeva 2007). Indicators included a set of commonly used soil chemical and physical properties developed in Soviet times (Zaslavski 1983). This information was then linked to the recent experiences of individual land users and systematically recorded by means of WOCAT questionnaires (Liniger and Critchley 2007), thus integrating quantitative and qualitative approaches.

The other study was conducted by Wolfgramm et al (2007) and focused on digital soil mapping to identify hot spots of soil degradation and bright spots of soil conservation at the district scale. It was conducted based on a large soil sample set collected using a systematic sampling design. A soil spectral library was established for efficient prediction of soil organic carbon (SOC) based on samples from soil reflectance measurements conducted in the laboratory. The large sample set allowed for subsequent calibration of SOC content to satellite imagery. SOC values were also regressed to the traditionally more widely used organic matter content values. Classification tree models proved efficient when linking ground-truth data and information from satellite imagery in the heterogeneous area (Wolfgramm et al 2007).

The fourth study focused on the provincial scale, on the Gorno Badakhshan Autonomous Oblast (GBAO), Tajikistan (Figure 1). The aim was to model the degradation risk for *teresken*, a shrubby vegetation which in the Pamirs is nowadays extensively used as a fuel substitute. A spatial fuzzy logic-based modelling approach applied to an expert-based classification tree was adopted. This approach has so far been applied mainly at a smaller scale (e.g. global resource assessments). In this study, the approach was further developed for application at the village level. The study was intended to investigate knowledge about land resources available at different stakeholder levels and to address its role in SLM (Breu 2006a).

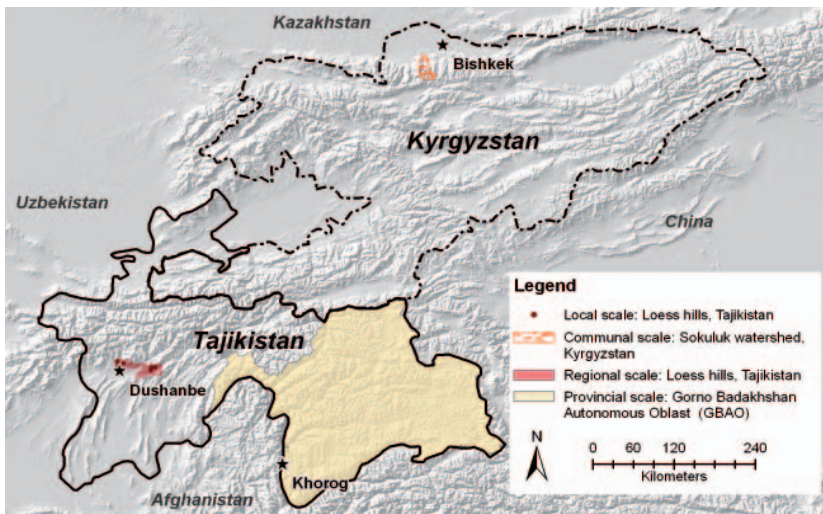


Fig. 1  
Map of Central Asia and the four Swiss National Centre of Competence in Research (NCCR) North-South study sites. (Map by Bettina Wolfgramm)

### 15.3 Results: responses and opportunities for SLM

This section presents results related to responses to the challenges created in the transformation context and highlights opportunities for SLM in the same context. Additionally, a summary of the lessons learned from the different methodological approaches applied in the specific Central Asian context is provided in section 15.3.4.

#### 15.3.1 Responses: the current state of land resources resulting from land-use changes

Today in Central Asia the situation generally reported is one of widespread and severe land degradation (Sadikov 1999). The results of the four studies presented here confirm ongoing land degradation in many places. However, this understanding must be refined, as spatial variability is high and various examples of well-conserved land resources do exist. This is demonstrated especially in the two studies from the Tajik loess hills (Akhmadov and Nekushoeva 2007; Wolfgramm et al 2007).

Newly collected empirical data on the state of land resources show that in the loess region of central Tajikistan large areas are affected by water erosion, with 45% of the study area classified as showing indications of erosion (Wolfgramm et al 2007). In the Sokuluk basin in Kyrgyzstan, forage productivity on pre-mountain and mountain pastures close to villages has generally decreased between 1% and 34% since 1978 (Shigaeva et al 2007). Based on the *teresken* degradation risk model it was calculated that *teresken* areas with a low, medium or high degradation risk cover a total of roughly 30% (or 19,000 km<sup>2</sup>) of the surface of GBAO (Breu 2006a; Figure 2). However, by contrast with this negative picture, classification of the loess areas in Tajikistan showed that 33% of the area classified was well conserved (Wolfgramm et al 2007).

All four studies showed that severe management problems and the related depletion of natural resources today seem to be linked to the fact that the financial, human and physical resources of farmers are very limited. Thus, the intensity of use of these natural resources today is closely linked to the accessibility of areas and their vicinity to villages. This effect was observed for different land-use types: (i) for pasture use in the Pamirs (Haslinger et al 2007) and in Kyrgyzstan (Shigaeva et al 2007), where use of remote high-mountain pastures was abandoned and where forage productivity has



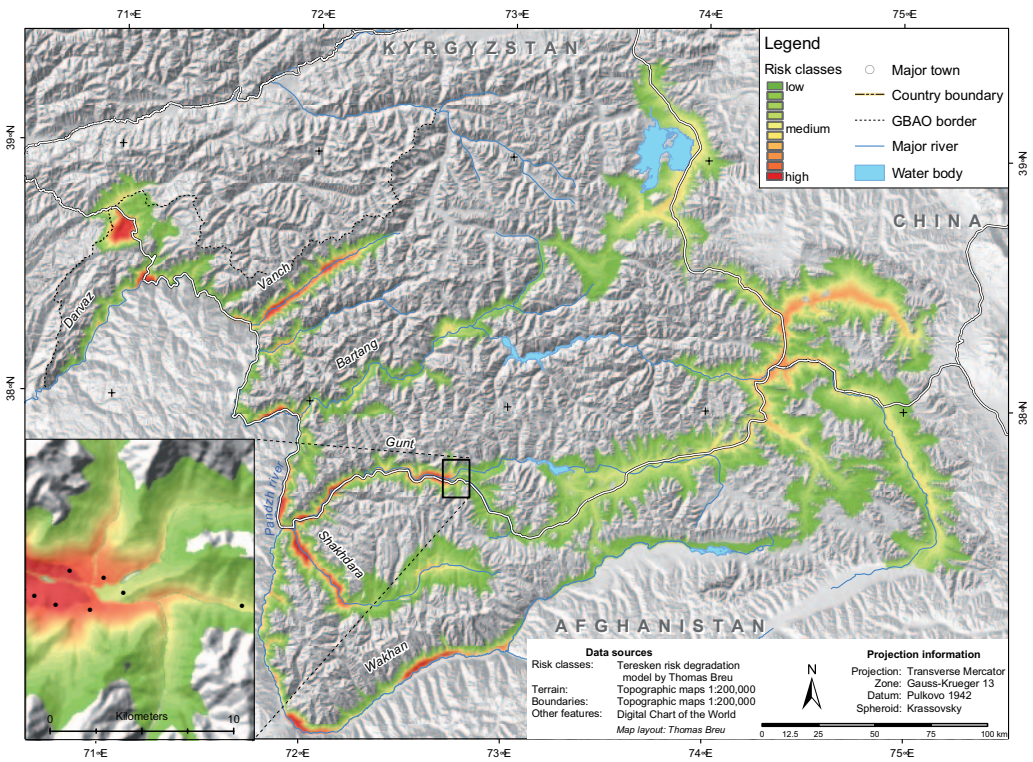


Fig. 2  
Extract of the  
*teresken* degrada-  
tion risk map  
(Source: Breu  
2006a)

increased from 5% to 22% since 1978; (ii) for *teresken* use in the Pamirs (Breu 2007), where a steep gradient of *teresken* degradation risk over a short distance is expected at a walking distance of around 5 hours from villages; and (iii) for temporally cropped fields in the loess hills of central Tajikistan, where patterns of soil-degradation hot spots are observed in the vicinity of settlements (Wolfgramm et al 2007).

### 15.3.2 Responses: land-use change and implications for livelihoods

The Kyrgyz study revealed how the ongoing transformations called for the development of radically new livelihood strategies adapted to the emerging market-based economy in a changing political environment. Shigaeva et al (2007) identified three different livelihood strategies: (i) an accumulation strategy, applied by wealthy households, where renting and/or buying of land is a key element; (ii) a preserving strategy, applied mainly by inter-

mediate households, which are very often forced to return their land to the commune or sell it to wealthier households; (iii) a coping strategy, applied mainly by poor households consisting of elderly pensioners or headed by single mothers, whose agricultural production is very low and barely covers subsistence needs due to their limited labour and economic power; pensions and social allowances form the backbone of these households' income. The study showed that in the study areas the main avenues for rural families to increase their wealth are to be found in the agricultural sector and consist in controlling more and mainly irrigated land, as well as in increasing live-stock. Ensuring access to land for the poor is therefore imperative to combat rural poverty and socio-economic disparities in rural Kyrgyzstan.

### 15.3.3 Opportunities: examples of SLM

The Tajik study conducted at the regional level showed that various opportunities for SLM in the loess hills of Tajikistan exist and include specifically the following land-use systems: (i) fruit, cereal and fodder plots, either traditionally cultivated or newly established; (ii) large-area conservation systems implemented in Soviet times and diversified into agroforestry systems during the 1990s; and more recently, (iii) agronomic conservation measures on farm cropland, such as crop rotation and cultivation of perennial fodder (Wolfgang et al 2007).

Fig. 3  
Degrading and  
well-conserved  
areas, Faizabad,  
Tajikistan.  
(Photo by Gulniso  
Nekushoeva, 2006)

In the Tajik study conducted at the local level, a significant impact of conservation measures, especially on organic matter content in the topsoil, was detected in a case study in Varzob. In this area, slopes of around 30% are used communally and are heavily overgrazed, resulting in reduced vegeta-





tion cover and severe sheet and rill erosion. Already in 1982, an innovative land user began to set up a half-hectare vineyard/fruit plot with intensive grass/fodder production for cut-and-carry use (Liniger and Critchley 2007). Today this management practice has led to distinct differences in the content of soil organic matter, with an organic matter content of over 1.5% to over 2% in conserved areas, as opposed to less than 1.5% in degraded areas (Akhmadov and Nekushoeva 2007).

Nekushoeva also found that even degraded areas have a potential to be used for agricultural production when adequately managed – such as degraded pasture areas when fenced in and cultivated with alfa-alfa. While soil properties in such areas change slowly and inconsistently, productivity rapidly increases several times over (Akhmadov and Nekushoeva 2007).

#### **15.3.4 Summarising methodological experiences**

Analysis of the above studies led to three types of conclusions regarding the application of more efficient methods for assessing land degradation and conservation in Central Asia:

**Research questions and required spatial scales:** Comparison of the studies described above highlights differences in the availability of data and the feasibility of specific analyses for each scale. At the provincial scale (1:500,000), data are highly generalised and often remotely sensed; expert-knowledge-based classification models might be applied, but ground-truth information for verification is often scarce. Thus, such coarse information is mainly indicative and suitable for preliminary analysis of risks and/or opportunities. At the district scale (1:50,000), collection of representative field data is feasible and can be used to calibrate remotely sensed data. Resulting maps provide information on the state of resources and are also useful for monitoring. However, the level of generalisation of the data is high, allowing mainly for qualitative analysis with regard to the effect of land use on natural resources, e.g. soil. Case studies (1:5000) allow for sampling of well-defined, homogenous areas at a high density, and thus facilitate controlling of influencing factors. This allows for quantitative impact assessments.

**Classification tree modelling – successful approaches for spatial assessments in heterogeneous areas:** Today, spatial datasets are readily accessible, e.g. in the form of satellite images. However, highly heterogeneous areas are challenging with regard to satellite image classification. In the pre-

vious section, two studies were mentioned that included different types of tree models: (i) an expert-knowledge-based classification tree model combined with fuzzy logics (Breu 2006b) and (ii) a modelling approach based on statistical algorithms (Wolfgramm et al 2007). Classification tree models are non-parametric and thus provide a well-suited approach for heterogeneous areas. Further advantages are straightforward integration of various datasets and linking of rules observed in the field with models.

**Collaboration between land users and scientists (transdisciplinary approaches):** The results from the interviews conducted with farmers using the WOCAT questionnaires showed that farmers' knowledge is decisive for planning SLM. While researchers are better equipped to verify and quantify processes, land users provide crucial information regarding land management and degradation and conservation processes (Akhmadov and Nekushoeva 2007). Thus, there is great potential in concurrently applying transdisciplinary approaches and disciplinary scientific methods. Furthermore, the results of the study by Breu (2006a) show that on average, knowledge of SLM at different stakeholder levels differs little, while differences within a stakeholder level can be considerable. These experiences confirm the importance of exchange among stakeholders, also within the individual stakeholder levels, in order to share knowledge about SLM and to negotiate and coordinate actions.

## 15.4 Conclusions and implications

This section draws conclusions and provides recommendations for future research. Based on the synthesis at hand, the following three aspects were considered of crucial importance in creating opportunities for SLM in Kyrgyzstan and Tajikistan:

**Information basis for land-use planning:** Approaches were identified and applied to efficiently collect information on the state of land resources at different scales relevant to land-use planning. Today geographic information systems (GIS), remote sensing and efficient laboratory methods play an important role in mapping. Studies have shown that transdisciplinary approaches for identifying SLM options at the plot level are decisive. Thus, participatory (GIS) approaches should be used also for land-use planning and monitoring activities at the district and provincial levels.

**Abandonment of agricultural plots:** This phenomenon has been observed to be linked to widespread labour migration. While in some cases abandonment of cultivation can take pressure off the land, heavily degraded fallow land can also degrade further when abandoned. However, with rising food prices<sup>9</sup> it is expected that crop production on marginal land will increase again. As labour migration is very important for both Tajikistan and Kyrgyzstan, it is recommended that research be conducted on the effect of migration and the availability of human resources, on abandonment of cultivation and its effect on land degradation and conservation, as well as on SLM options adapted to households with a limited workforce.

**Pasture management:** Results show that large areas are used as pastures and that increasing the number of livestock is one of the main options for rural families to increase their wealth. However, easily accessible pastures in particular are highly affected by degradation processes. At the same time, land regulations regarding pastures show distinct deficiencies, for example regarding clear administrative responsibilities. Although the studies presented here identify various entry points to SLM, they focus mainly on the management of small plots, whereas opportunities for improved pasture management are lacking. Thus, there are many implications for future research in the field of pasture management. For Kyrgyzstan, important new topics and research questions have already been identified. They include transhumance to summer pastures, improved pasture and livestock management (e.g. pasture information systems), and pasture law, including the role of different institutions in land management as well as human and animal health risks.

## Endnotes

### Full citation for this article:

Wolfgang B, Shigaeva J, Nekushoeva G, Bonfoh B, Breu T, Liniger HP, Maselli D. 2010. Kyrgyz and Tajik land use in transition: Challenges, responses and opportunities. In: Hurni H, Wiesmann U, editors; with an international group of co-editors. *Global Change and Sustainable Development: A Synthesis of Regional Experiences from Research Partnerships*. Perspectives of the Swiss National Centre of Competence in Research (NCCR) North-South, University of Bern, Vol. 5. Bern, Switzerland: Geographica Bernensia, pp 241–254.

### Acknowledgements:

Investigations of the various studies synthesised in this article were supported by the Swiss National Centre of Competence in Research (NCCR) North-South. We thank Inam-ur-Rahim and Joldoshebek Kasymbekov for their contributions during the synthesis workshop that took place on 13–15 September 2007 in Bishkek, Kyrgyzstan.

<sup>1</sup> Bettina Wolgramm is a Senior Research Scientist at the Centre for Development and Environment (CDE), University of Bern. Her main field of expertise is geographic information systems (GIS) and remote sensing applications for regional land-cover and soil monitoring. One of her special interests is the identification of multi-scale indicators using soil reflectance spectrometry.

E-mail: Bettina.Wolgramm@cde.unibe.ch

<sup>2</sup> Jyldyz Shigaeva is a Senior Researcher at the Institute of Mountain Physiology, National Academy of Sciences of the Kyrgyz Republic. Her main scientific fields of expertise and interest are mountain ecology, land use and rural livelihoods.

E-mail: zhyldyz@rambler.ru

<sup>3</sup> Gulniso Nekushoeva is a Senior Researcher at the Tajik Soil Institute in Dushanbe, Tajikistan. She has been involved in soil mapping for over 20 years. In the past few years she has been focusing on comparative case studies aiming at assessing the impact of sustainable land management systems using both participatory and quantitative methods.

E-mail: gulniso@mail.ru

<sup>4</sup> Bassirou Bonfoh is a veterinarian and Director General of the Centre Suisse de Recherches Scientifiques (CSRS) in Abidjan, Côte d'Ivoire, as well as Regional Coordinator for the Swiss National Centre of Competence in Research (NCCR) North-South in West Africa. He is involved in international research networks in the fields of epidemiology of zoonotic diseases in pastoral production systems. He has a specific interest in expanding the “one health” concept in academic and research institutions in Africa.

E-mail: bassirou.bonfoh@csrs.ci

<sup>5</sup> Thomas Breu has a PhD in Geography with minors in Economy and Geology. Thomas Breu has over 10 years of experience in developing and transition countries in Southeast Asia and Central Asia. Besides his various coordinating roles, e.g. as Programme Coordinator of the Swiss National Centre of Competence in Research (NCCR) North-South, he has an extensive track record of publications on geographic information systems (GIS), watershed management, sustainable land management and participatory strategy development.

E-mail: Thomas.Breu@cde.unibe.ch

<sup>6</sup> Hanspeter Liniger is a Senior Research Scientist at the Centre for Development and Environment (CDE), University of Bern, and Programme Coordinator of WOCAT (World Overview of Conservation Approaches and Technologies). His professional focus is on evaluation of natural resource management (soil and water conservation) and its local and regional impacts on water and soil productivity; dryland management; and training of professionals and supervision of students.

E-mail: Hanspeter.Liniger@cde.unibe.ch

<sup>7</sup> Daniel Maselli is Senior Research Scientist at the Centre for Development and Environment (CDE), University of Bern, Switzerland, and Associate Senior Research Fellow at the University of Central Asia (UCA) in Bishkek, Kyrgyzstan. His main field of expertise is natural resource use in semi-arid mountain regions with a particular focus on transhumance and sustainable pasture management. He recently joined the Swiss Agency for Development and Cooperation (SDC).

E-mail: daniel.maselli@ucentralasia.org, daniel.maselli@deza.admin.ch

<sup>8</sup> WOCAT: World Overview of Conservation Approaches and Technologies

<sup>9</sup> <http://enews.ferghana.ru/article.php?id=2124>

## References

Publications elaborated within the framework of NCCR North-South research are indicated by an asterisk (\*).

- \* Akhmadov HM, Nekushoeva G. 2007. The main SLM methods in rainfed areas [in Russian]. *Agricultural Academy Reports Journal* 14(4):37–44.
- Bloch P. 2002. *Agrarian Reform in Uzbekistan and Other Central Asian Countries*. Working Paper No. 49. Madison, WI: University of Wisconsin, Madison, Land Tenure Center.
- \* Breu T. 2006a. *Sustainable Land Management in the Tajik Pamirs: The Role of Knowledge for Sustainable Development* [PhD dissertation]. Bern, Switzerland: Swiss National Centre of Competence in Research (NCCR) North-South and Centre for Development and Environment (CDE), University of Bern. Also available at: [http://www.nccr-north-south.unibe.ch/publications/Infosystem/On-line%20Dokumente/Upload/PhD%20Breu-SLM%20Pamirs\\_2006.pdf](http://www.nccr-north-south.unibe.ch/publications/Infosystem/On-line%20Dokumente/Upload/PhD%20Breu-SLM%20Pamirs_2006.pdf); accessed on 23 July 2009.
- \* Breu T. 2006b. Spatial environmental risk modelling in the Pamir-Alai Mountains: Application of a fuzzy-logic based GIS approach. In: *Proceedings of the International Disaster Reduction Conference (IDRC), Davos, 27 August – 1 September, 2006*. Davos, Switzerland: Swiss Federal Research Institute, pp 705–708.
- DFID [Department for International Development]. 2000. *Sustainable Livelihoods Guidance Sheets*. London: Department for International Development.
- Dudwick N, Gomart E, Marc A. 2003. *When Things Fall Apart: Qualitative Studies of Poverty in the Former Soviet Union*. Washington, D.C.: World Bank.
- \* Haslinger A, Breu T, Hurni H, Maselli D. 2007. Opportunities and risks in reconciling conservation and development in a post-Soviet setting: The example of the Tajik National Park. *International Journal of Biodiversity Science and Management* 3(3):157–169.
- Hurni H. 2000. Assessing sustainable land management (SLM). *Agriculture Ecosystems & Environment* 81:83–92.
- Jones KD. 2004. Land privatization and conflict in Central Asia: Is Kyrgyzstan a model? In: Burghart D, editor. *In the Tracks of Tamerlane: Central Asia's Path to the 21<sup>st</sup> Century*. Washington, D.C.: National Defense University, Center for Technology and National Security Policy (CTNSP), pp 258–272.
- Kyrgyz Giprozem [Kyrgyz State Institute for Land Management Planning]. 1987. *Methodological Guidelines to Conduct Geobotanical Research on Natural Fodder Lands of the Kyrgyz SSR* [in Russian]. Bishkek, Kyrgyzstan: Kyrgyz Giprozem.
- Liniger HP, Critchley W, editors. 2007. *Where the Land Is Greener: Case Studies and Analysis of Soil and Water Conservation Initiatives Worldwide*. Bern, Switzerland: World Overview of Conservation Approaches and Technologies (WOCAT), CTA, Food and Agriculture Organization of the United Nations (FAO), United Nations Environment Programme (UNEP), and Centre for Development and Environment (CDE).
- \* Ludi E. 2003. Sustainable pasture management in Kyrgyzstan and Tajikistan: Development needs and recommendations. *Mountain Research and Development* 23(2):119–123.
- Nissen SW. 2004. Tajiks' promised land – A farm of one's own. *OSCE Magazine* 1(3):4–7.
- Sadikov KR, editor. 1999. *Mountain Regions of Central Asia – Sustainable Development Issues*. Dushanbe, Tajikistan: Tajik Technical University.
- Shepherd KD, Walsh MG. 2002. Development of reflectance spectral libraries for characterization of soil properties. *Soil Science Society of America Journal* 66:988–998.
- \* Shigaeva J, Kollmair M, Niederer P, Maselli D. 2007. Livelihoods in transition: Changing land use strategies and ecological implications in a post-Soviet setting (Kyrgyzstan). *Central Asian Survey* 26(3):389–406.
- \* Wolfram B, Seiler S, Kneubühler M, Liniger HP. 2007. Spatial assessment of erosion and its impact on soil fertility in the Tajik foothills. *EARSeL eProceedings* 6(1):12–25.
- Zaslavski MN. 1983. *Studying Soil Erosion* [in Russian]. Moscow, Russia: Mysl.

## 16 Natural Resource Institutions in Transformation: The Tragedy and Glory of the Private

Christine Bichsel<sup>1</sup>, Gilbert Fokou<sup>2</sup>, Asel Ibraimova<sup>3</sup>, Ulan Kasymov<sup>4</sup>, Bernd Steimann<sup>5</sup>, and Susan Thieme<sup>6</sup>

### Abstract

The present article focuses on continuity and change in natural resource institutions in post-Soviet Kyrgyzstan. Two main trends have characterised the management of water, agricultural land and pastures since the country became independent in 1991. First, while natural resources were collective and state-owned during the Soviet period, they are now being gradually privatised and passed into individual or group ownership. Second, by contrast with central administration under the Soviet regime, after independence natural resource management has been and is increasingly being decentralised to the community level. We suggest that these processes have created a new concept of the 'private', defined as clearly assigned property rights as opposed to 'commons', and individual or group ownership as opposed to 'public' ownership. We attempt here to analyse how privatisation and decentralisation have created new property relations and new forms of natural resource governance. We conclude that these processes have yielded both favourable and unfavourable outcomes.

**Keywords:** Post-socialist transformation; natural resource institutions; privatisation; decentralisation; water; agricultural land; pastures; Kyrgyzstan.

## 16.1 Introduction

Privatisation and decentralisation in Kyrgyzstan have altered natural resource use and management. This article traces the emergence of the 'private' and discusses its 'glories' and 'tragedies' in terms of favourable and unfavourable outcomes. The term 'private' entails two dimensions. First, 'private' relates to the 'tragedy of the commons' proclaimed by Garrett Hardin (1968), who, in brief, posits a Malthusian relationship between unregulated access to natural resources and over-exploitation and degradation of these resources. He bases this relationship on the idea of self-interested individuals who strive for maximisation of benefits rather than protecting the common good. In this view, the 'private' as opposed to the 'commons' denotes clearly defined property rights that restrict access and regulate demand, thus avoiding Hardin's tragedy. The 'tragedy of the commons' remains an implicit assumption that shapes critique of excessive use and degradation of natural resources in the former Soviet Union (Mirovitskaya and Soroos 1995). Analysts, mainly of Western origin, understand Soviet public ownership as a 'property vacuum' that represents a form of Hardin's commons and in practice leads to an open access situation – hence the prescription of clearly assigned property rights.

Second, 'private' refers to a form of ownership not by the state, but by individuals or groups. Yet in this sense private property is more than a form of ownership. It is a concept that has ideological effects. In particular, individualised private exclusive ownership is posited as the basis of democratic politics and stable market economies (Hann 1998; Verdery 2004b). Moreover, the controversy regarding public and private property regimes had political symbolism and characterised the central ideological opposition of the state socialist and capitalist systems during the Cold War period. Therefore, transformation of property regimes – i.e. privatisation – throughout the post-socialist space needs to be understood in the context of this ideological opposition.

We argue that exploration of the two aspects of the 'private' outlined above constitutes an important contribution to understanding post-socialist transformation.<sup>7</sup> Post-socialist transformation is defined first of all as the sum of social, economic and political changes that have occurred and continue to occur in Kyrgyzstan (and in varying forms in other countries) since the demise of state socialism. Second, it is defined as a process that links the past to the future (Burawoy and Verdery 1999). While we aim at a descriptive



rather than a prescriptive use of the term, we acknowledge that evaluation of processes attributed to it is hardly ever value-free. We mark the beginning of post-socialist transformation with the independence of Kyrgyzstan. However, we also take into account that the final years of the Soviet Union were constitutive in this process. Not only was this period formative in terms of present-day post-Soviet realities, but it also serves as a point of reference for people's subjective interpretations of transformation.

The present article draws on empirical research on land, water and pasture management conducted in Kyrgyzstan between 2002 and 2007 within the framework of the Swiss National Centre of Competence in Research (NCCR) North-South programme. The next section presents a descriptive account of privatisation and decentralisation of natural resources in independent Kyrgyzstan. This is followed by an exploration of how privatisation and decentralisation have altered social relations with respect to natural resources, and an examination of the new forms of natural resource governance. Finally, conclusions are drawn from our analysis of the 'private'.

## **16.2 Privatisation and decentralisation in independent Kyrgyzstan**

Privatisation entails the transfer of property from state or collective entities to private actors. Privatisation programmes were introduced in Kyrgyzstan as early as December 1991. In the course of the following years, a vast array of state enterprises and state-owned utilities were transferred to private entities by means of vouchers and cash auctions.<sup>8</sup> For this endeavour, the newly independent state received strong political backing and monetary support from international financial institutions (i.e. the International Monetary Fund and the World Bank) which assigned a high priority to privatisation (Pomfret 2004). In the case of natural resources, Kyrgyzstan largely privatised excludable goods such as agricultural land and cattle, but has so far retained state ownership of some common-pool and key natural resources such as forests, pastures and water.

Agricultural land has been successively transferred from state and collective farms to private ownership by peasant farms.<sup>9</sup> In a first step, the government allocated land-use rights to peasant farms for 99 years in 1995. These rights, inscribed in land-use certificates, were converted to ownership documents in 1998. The Land Code<sup>10</sup> adopted in 1999 initially foresaw a five-

year moratorium on agricultural land sales, which, however, was gradually eased and eventually lifted by 2002 (Bloch and Rasmussen 1998; Giovarelli 1998; Bloch 2002). While livestock was privatised by distribution to entitled individuals, pastures have remained state property as regulated in the Land Code. Individuals or economic entities may, however, conclude leasing agreements for grazing rights over a period of five to ten years (Farrington 2005). The Water Code<sup>11</sup> adopted in 2005 defines water as state property, but grants every person within the boundaries of Kyrgyzstan the right to use water for a finite list of purposes, including irrigation. An irrigation service fee was introduced in 1995 and finally implemented in 1999. While inter-farm irrigation infrastructure also remains state-owned, the ownership of on-farm (tertiary) infrastructure is transferred to formalised irrigation communities (Ul Hassan et al 2004; Herrfahrdt et al 2006; Sehring 2007).

Decentralisation transfers centralised state authority to lower political levels and delegates authority to governmental and non-governmental bodies. In Kyrgyzstan, the process of decentralising the political and economic system inherited from the Soviet period began soon after independence.<sup>12</sup> It centres on the concept of 'local self-governance'. The most relevant body in this respect is the village administration (*aiyl ökmötü*), which was introduced in 1996. It subsumes clusters of villages – most of which were part of the same state or collective farm – under the same executive and representative body. The law defines the village administration as independent from central government. The decentralisation process has received strong support from the United Nations Development Programme and other international aid organisations.<sup>13</sup> It was implemented by the central government as a top-down process rather than being driven by the population (Ibraimova 2009).

In the case of agricultural land, the village administration was entitled to hold property in 2002 and is thus in charge of managing municipal infrastructure and the land in the Redistribution Fund. With regard to pastures, the village administration holds the right to conclude lease agreements and collect taxes for grazing areas in the vicinity of villages. With regard to irrigation water, Kyrgyzstan has transferred and is still transferring authority for irrigation management to Water User Associations (WUAs). WUAs are non-commercial voluntary associations of water users that finance themselves through members' payments for water service delivery. Usually established along the boundaries of the former state and collective farms, they are intended to operate, maintain and rehabilitate the irrigation system, deliver water to the end users, purchase water from the state, and collect water fees from users

(Ul Hassan et al 2004; Herrfahrdt et al 2006; Sehring 2007). The country received strong financial and logistic support from the Asian Development Bank and the World Bank for country-wide development of WUAs.<sup>14</sup>

### **16.3 New property relations concerning natural resources**

Property relations are a specific form of social and cultural relations among humans with respect to natural resources (Hann 1998; Humphrey and Verdery 2004). Privatisation and decentralisation alter property relations in two ways: first, they transform the nature of people who engage in social relations with respect to natural resources, and second, they redefine the way the natural resources at stake are constituted (Table 1). In the case of Kyrgyzstan, these processes have created an unprecedented form of personhood: the ‘peasant farmer’. Far from being a naturally existing category, the peasant farmer emerges as both a means and an end of privatisation and decentralisation. The peasant farmer becomes the holder of property rights, but it is the very social concept translated into spatial boundaries that allows property to be reassigned in the first place. Equally, the peasant farmer becomes the basic social unit of rural livelihood production, engagement in the market economy, preservation of natural resources and the environment, and realisation of local self-governance. But transfer of political power and delegation of authority are only possible on the grounds of the peasant farmer’s conceptual existence.

In practice, a vast number of farmers clearly support and approve of private land ownership. They either produce for subsistence or participate in the evolving rural and urban agricultural and livestock markets in Kyrgyzstan. A smaller number of farmers engage in emerging profitable agricultural businesses beyond the national border.<sup>15</sup> At the same time, farmers often perceive themselves as ‘unemployed’ or ‘without a job’ (Lindberg 2007, p 69; Rohner 2007). This may be the result of previous Soviet practices, whereby agricultural workers were provided with salaried jobs. Alternatively, it could be a strategy for dealing with the Ministry of Labour and Social Protection, which monitors income and submits those categorised as ‘poor’ to the Employment Centre for unemployment allowances (Ibraimova 2009). But in this context we suggest that a lack of ‘professionalisation’ also hints at a hitherto absent social identity and societal valuation. Becoming a peasant farmer is – at least initially – not an entrepreneurial option as neo-liberal

Table 1

Impacts of privatisation and decentralisation on property relations related to natural resources in Kyrgyzstan.	<b>Changes in property relations</b>	<b>Processes</b>
	Emergence of the 'peasant farmer'	<ul style="list-style-type: none"> <li>- The concept of the 'peasant farmer' emerges as both the means and end of privatisation and decentralisation</li> <li>- Actual practice lacks social identity and valuation</li> </ul>
	Monetarisisation and new values of natural resources	<ul style="list-style-type: none"> <li>- Renders people 'responsible' and 'self-governing' in a neo-liberal framework</li> <li>- Attributes higher value to some natural resources and makes others lose value</li> </ul>
	Natural resources become an asset and obligation	<ul style="list-style-type: none"> <li>- Empowerment and freedom of choice through ownership</li> <li>- Private ownership leads to new risks, liabilities and burden</li> </ul>
	Reconfiguration of wealth and social status	<ul style="list-style-type: none"> <li>- Privatisation processes lead to unequal benefits</li> <li>- Private ownership results in new social stratification</li> </ul>

reasoning constructs it, but is often the last resort in comparison with other socially and economically more beneficial opportunities, such as migrating for low-skilled but better-paid work to the capital of Bishkek or to Kazakhstan or Russia (Thieme 2007).

The constitution of natural resources has been altered by monetarisisation, through the process of assigning prices to the potential benefits derived from resources (e.g. irrigation service fee). This is not to say that natural resources were completely outside the realm of economic relations during the Soviet period.<sup>16</sup> But with the form of capitalism that followed independence, monetarisisation – and the market in particular – became imperative (Wood 1994). Assigning a price to property and services was guided by ideas of economic efficiency, but also by the attempt to render people responsible and self-governing within a neo-liberal framework. By this reasoning, the monetarised natural resource was to appear as a scarce good of (monetary) value with which people could engage in a specific form: environmental stewardship, political agency, and efficient economic transactions.<sup>17</sup>

With ownership, it is expected that people will bestow new values on natural resources and therefore help protect them from degradation. At the same

time, ownership implies new obligations. When privatised land carries liabilities (Verdery 2004a), repair and maintenance of transferred irrigation infrastructure turn into a financial burden (Bichsel 2009), and livestock ownership devolved to individual herders becomes a risk (Farrington 2005). Moreover, newly owned objects have gone from being valuable to being valueless or vice-versa, simply because the surrounding conditions changed.<sup>18</sup> This is illustrated by the greater value attributed to pastures near villages and the diminished importance of more distant high-altitude villages after the collapse of the Soviet supply and transportation network (Ludi 2003; Shigaeva et al 2007; Liechti, submitted). Similarly, users at present greatly prefer gravity-operated to pump-fed systems for irrigation. The latter were designed for the Soviet socio-economic system, with heavily subsidised electricity and state infrastructure maintenance. When this network fell apart, pumps transferred to communities became a burden to users and a liability with respect to ensuring water supply (Bichsel 2009).

Changed values brought about winners and losers, most succinctly summarised in a colloquial expression: *prikhvatisatsiia*. The collated words *privatisatsiia* (Russian for ‘privatisation’) and *khvatat’* (‘to grab’) denote the illicit appropriation of former or present state property for private use.<sup>19</sup> The expression entails both ridicule of the actual process of privatisation and a social critique of its sometimes grossly unequal and unjust outcomes. Not only did privatisation processes allow for inequalities; private ownership itself resulted in new social stratification. Shigaeva et al (2007) argue that the social dynamics in two northern Kyrgyz villages reflect reassignment of agricultural production assets to wealthier households. While post-socialist distribution of wealth appears to reflect former disparities – and thus to counter the ideological picture of a ‘levelled’ Soviet society – the influx of new financial resources such as remittances reconfigures and possibly also amplifies these disparities (Rohner 2007). Unequal accumulation and consumption of wealth alter moral perceptions and remake familial and social networks (Wanner 2005), as indicated by the low prestige of agricultural work on fields now done by the poor for the wealthier (Lindberg 2007).<sup>20</sup>

#### **16.4 Altered governance of natural resources**

Natural resource governance is understood as the arrangements of power and forms of authority that regularise the appropriation, distribution and value of natural resources in society (Hann 1998; Humphrey and Verdery 2004).

Altered governance thus raises the question of the legislative framework, as well as of other norms and relationships that shape current social practices related to natural resources (Table 2). Formal state law in independent Kyrgyzstan draws on a number of sources. The present legislative system succeeds Soviet law, but is also inspired by post-socialist Russia’s legal science and law-making (Ibraimova 2009). At the same time, Western legal concepts entered legislation in Kyrgyzstan following independence and continue to shape the law. As discussed above, the country welcomed standards and practices recommended by international organisations for governance of natural resources. Finally, invoking its historical heritage, Kyrgyzstan has introduced institutions referred to as ‘traditional’ which presumably or actually existed prior to the Soviet period. This ‘re-traditionalisation’ of law is reflected in the formalisation of elders’ courts with the authority to adjudicate minor disputes over water and land at village level (Beyer 2006).

Evidence shows that social practices related to natural resources do not fully mirror the legislative framework (see, for example, Steimann 2008). Depending on their normative position, observers speak of a ‘lack of rule of law’ (Kangas 2004) or ‘hybrid institutions’ (Koehler and Zürcher 2004). Discrepancies between the legal and the empirical appear to have existed as a key element in Soviet institutional patterns and thus suggest a certain continuity. We propose that current social practices are governed by four main frameworks: first, the legal framework and respective policies already discussed; second, pre-independence structures and imaginaries, such as

Table 2

Governance of natural resources in Kyrgyzstan.	<b>Frameworks</b>	<b>Informed by...</b>
	1. Formal law and policies	<ul style="list-style-type: none"> <li>– Soviet law</li> <li>– Russian legal thought</li> <li>– Western legal concepts</li> <li>– Introduction of ‘traditional’ law</li> </ul>
	2. Pre-independence structures and imaginaries	<ul style="list-style-type: none"> <li>– Soviet administrative divisions</li> <li>– Existing infrastructure</li> <li>– Past experiences and value systems</li> </ul>
	3. Local moralities and norms	<ul style="list-style-type: none"> <li>– Boundaries of collectivities</li> <li>– Rules of reciprocity and trust</li> <li>– Customary law (<i>adat</i>)</li> </ul>
	4. On-site power relations	<ul style="list-style-type: none"> <li>– Social and political configurations</li> <li>– Wealth, status and connections</li> </ul>

ethno-territorial administrative divisions (Haugen 2003), infrastructural politics (Obertreis 2007), and previous experiences and value systems (Liechti, submitted); third, local moralities and norms that regulate the formation of collectivities, reciprocity and trust (Rohner 2007; Ibraimova 2009); and fourth, on-site power relations such as upstream–downstream constellations in irrigation systems (Bichsel 2009) or the advantageous position that ‘status’ bestows for access to irrigation water (Lindberg 2007).

The discrepancy between the legal framework and social practices entails inherent tension. Law is a normative prescription for behaviour, and the gap between the ‘ought’ and the ‘is’ raises questions about forms of authority and power that regulate actual social practices, and about their basis for legitimacy. The extended room for manoeuvre to bend formal rules is attributed to wealth, ‘status’ and social connections (Lindberg 2007; Rohner 2007; Shigaeva et al 2007). While the importance of connections may constitute a continuation of Soviet practices (Kuehnast and Dudwick 2002), it appears that status and wealth are now becoming more closely interlinked and morally reconfigured. Monetary means create a form of influence that incites both respect and fear among people for its potential to promote one’s own interests and ‘achieve things’. Possession or promise of money bestows authority on semi-criminal actors and buys popular support for political candidates to ascend to power, but also accounts for the wide room for manoeuvre of development projects to pursue their objectives. Conversely, this also explains the lack of trust and the low status that state institutions with limited funds enjoy among the population when pitted against financially potent international organisations.

Yet legal reform and development policy assign importance to a different form of power: associational power that emerges from joint integrative action for a common purpose, usually expressed as ‘collective action’. Decentralisation is driven by the idea that collective action needs to replace the centrally assumed responsibilities of previous state socialism. For example, the transition to farmer-managed systems now requires new forms of collective action for sustained operation and maintenance (Gallati 2008). Moreover, through forms of public sociality and mobilisation, collective action should fill the presumed ‘public void’ (Fairbanks 1997) of the Soviet Union and mould a democratic society.<sup>21</sup> The main responsibility for people’s ability to recognise and exert their agency, Ibraimova (2009) argues, lies in the legislative and institutional framework the government provides. This framework has been significantly altered to enable collective action at

the community level. At the same time, Ibraimova contends that Kyrgyzstan has so far failed to successfully empower people for collective action due to its excessive focus on executive power and lack of the conditions required to secure public interests (ibid.).

Aid projects engage in institutional engineering for collective action through ‘community mobilisation’ and ‘initiative groups’. Here, their aims of political and societal reform account for specific ‘design principles’ to build collective action and related institutions. Such institutions are either built from scratch following the idealised image of Western democracy, or, alternatively, aid projects build on so-called ‘local traditions’ but include only selective aspects of these traditions that are of interest,<sup>22</sup> while at the same time attempting to transform their underlying societal model (Bichsel 2009). Since independence, aid projects have set up or supported a vast number of community-based organisations for collective action. Numerous persons have participated in such organisations, and have been able to voice their needs and join forces to address the challenges they face. At the same time, many of these organisations are highly dependent on financial and technical aid that often determines their terms and their very existence. Moreover, the resulting contradictory and parallel structures often create confusion and thus threaten rather than enable collective action (Ibraimova 2009). In summary, the public space no longer appears in its retrospective void, but appears overcrowded in the sense of a Hardinian tragedy.

## 16.5 Conclusion

Privatisation and decentralisation rely heavily on the administrative and conceptual boundaries of the socialist property regime. For example, Kyrgyzstan adopted the principle of re-distribution rather than restitution, as it did not aim to restore pre-Soviet individual or group rights to natural resources which had to be relinquished in the socialist collectivisation process. Rather, it took residential and professional affiliation during the last Soviet period as a baseline. Similarly, the concept and term of ‘local self-governance’ has its origins in Soviet law. After the rapid social development and deeply conservative politics of the Brezhnev period, Gorbachev separated spheres of authority for the different levels of government, if only administratively (Ibraimova 2009). Therefore, despite the ideological politics which surround privatisation and decentralisation in post-Soviet Kyrgyzstan, the ‘private’ is inevitably conditioned by its preceding property



regime. We therefore suggest that accounts of post-socialist transformation must acknowledge this past outside its ideological framework.

Legal and social engineering has achieved de facto private property and decentralised governance in Kyrgyzstan. Yet it appears that social imaginaries that attribute meaning to the facts do not necessarily correspond. The peasant farmer as the newly emerging basic social unit of privatisation and decentralisation is a discursive reality and a social fact. However, on closer examination, the integrity of this image breaks down. Similarly, devolution of power and decentralisation of authority to the newly created political level of 'local self-governance' has to a considerable extent been successful. Yet many people perceive local self-governance authorities and even the re-invented elders' courts – per definition not part of the state – as an element of the central state. We suggest that this may be both a stage of ongoing transformation as well as a particular manifestation of the 'private' in Kyrgyzstan's post-Soviet context.

At present, our research suggests that the 'private' has both its glories and its tragedies in terms of outcomes. In terms of the 'private' as opposed to Hardin's tragedy of the commons, evidence suggests that clearly assigned property rights have indeed altered people's relationships to natural resources in terms of responsibility for protecting their condition. On the other hand, concomitant processes such as reconfiguration of value, slowly emerging markets and growing inequalities have led to greater exploitation and degradation of natural resources. With regard to private property, people's appreciation of individual or group ownership, their empowerment through such ownership, and their freedom of choice clearly rank as a glory. Yet private property has so far not delivered the 'bright future' promised by market capitalism and liberal theory in terms of democratic politics and stable market economies.

## Endnotes

### Full citation for this article:

Bichsel C, Fokou G, Ibraimova A, Kasymov U, Steimann B, Thieme S. 2010. Natural resource institutions in transformation: The tragedy and glory of the private. *In*: Hurni H, Wiesmann U, editors; with an international group of co-editors. *Global Change and Sustainable Development: A Synthesis of Regional Experiences from Research Partnerships*. Perspectives of the Swiss National Centre of Competence in Research (NCCR) North-South, University of Bern, Vol. 5. Bern, Switzerland: Geographica Bernensia, pp 255–269.

### Acknowledgements:

The authors acknowledge support from the Swiss National Centre of Competence in Research (NCCR) North-South: Research Partnerships for Mitigating Syndromes of Global Change, co-funded by the Swiss National Science Foundation (SNSF), the Swiss Agency for Development and Cooperation (SDC), and the participating institutions.

<sup>1</sup> Christine Bichsel is a post-doctoral fellow at the University Priority Research Programme “Asia and Europe: Exchanges and Encounters” of the University of Zurich, Switzerland. Her research interests include development studies, peace and conflict research, and post-socialist transformation in Central Asia.

E-mail: christine.bichsel@access.uzh.ch

<sup>2</sup> Gilbert Fokou is a post-doctoral researcher at the Institut du Sahel in Bamako, Mali. His research focuses mainly on institutions for management of common property resources, on environmental conflicts, and on institutions and mechanisms for access of pastoral communities to natural resources and basic social services.

E-mail: gilbertfokou@yahoo.fr

<sup>3</sup> Asel Ibraimova is a member of the Commission on Environmental Law of the World Conservation Union (IUCN) and a member of the legal team at Cerner Ltd. Her research interests are governance, decentralisation and sustainable management of natural resources, with a focus on local institutions.

E-mail: asel\_i@yahoo.com

<sup>4</sup> Ulan Kasymov is Director of the NGO CAMP Alatoo in Bishkek, Kyrgyzstan. His main research interest is in institutions for natural resource management and rural development.

E-mail: ulan@camp.elcat.kg

<sup>5</sup> Bernd Steimann is a PhD researcher at the Department of Geography, University of Zurich, Switzerland. His research focuses on processes of post-socialist transformation, rural livelihoods and natural resource management in mountain areas in Central and South Asia.

E-mail: bernd.steimann@geo.uzh.ch

<sup>6</sup> Susan Thieme is a research fellow at the Department of Geography, University of Zurich, Switzerland. Her research interests are migration and development studies, particularly the multilocality of livelihoods, gender and generation, and social finance.

E-mail: susan.thieme@geo.uzh.ch

<sup>7</sup> In this article, we use the term ‘transformation’ rather than ‘transition’, which is more common in English literature. By doing so, we emphasise the all-encompassing changes of the political, social and economic system with the advent of the post-socialist period rather than the transition from an authoritarian to a democratic system only (Herbers 2006, pp 3–9).

<sup>8</sup> For a detailed account of progress and problems relating to privatisation in the 1990s, see Abazov (1999).

- <sup>9</sup> According to the 1999 Land Code, 25% of agricultural land remains in the Agricultural Land Redistribution Fund for lease to rural and urban citizens.
- <sup>10</sup> *Land Code of the Kyrgyz Republic*, 30 April 1999, with several amendments, most importantly the 2001 *Law on Agricultural Land Regulation*.
- <sup>11</sup> *Water Code of the Kyrgyz Republic*, 12 January 2005.
- <sup>12</sup> For a detailed overview of the different stages of decentralisation see Ibraimova (2009).
- <sup>13</sup> Compare Ackermann (2007) for an overview of the involvement of foreign donor organisations in decentralisation in Kyrgyzstan.
- <sup>14</sup> The establishment of a WUA has been a condition for international aid projects in the irrigation sector (Sehring 2007).
- <sup>15</sup> Examples include farmers in southern Kyrgyzstan catering to the demand for cherries in Russia, or livestock herders from Naryn province profitably selling white wool to traders from Kazakhstan and China.
- <sup>16</sup> For example, land and water played a pivotal role in the political economy of cotton production in Central Asia during the Tsarist and Soviet periods (Kandiyoti 2007). Moreover, historical studies show that economic transactions for natural resources were also frequent at the micro-economic level (see, for example, Thurman 1999).
- <sup>17</sup> At present, poplar trees are increasingly planted on private land plots as they fetch a good price on the timber market, and at the same time have a positive effect on the environment.
- <sup>18</sup> Values are a quality not of single objects or conditions of property, but of networks of things and institutions (Alexander 2004).
- <sup>19</sup> It is, however, rarely used for the case of natural resources and refers more to assets such as machinery or whole enterprises.
- <sup>20</sup> Such low prestige is, however, not observed in animal husbandry. In Naryn province, more and more households offer their herding skills as professional herders to livestock owners in order to generate income. The higher esteem attributed to such work may be related to the fact that herding, livestock and life on the pasture enjoy prestige among large segments of Kyrgyz society.
- <sup>21</sup> Whether or not Soviet public space was actually void is disputed. See, for example, Sievers (2002).
- <sup>22</sup> For example, aid projects are often interested in the capacity of elders to mobilise villagers for a collective task, or their presumed accountability to the public.

## References

Publications elaborated within the framework of NCCR North-South research are indicated by an asterisk (\*).

- Abazov R. 1999. Policy of economic transition in Kyrgyzstan. *Central Asian Survey* 18(2):197–223.
- Ackermann M. 2007. *Die lokale Selbstverwaltung in Kirgisistan* [MSc thesis]. Tübingen, Germany: Institute of Geography, University of Tübingen.
- Alexander C. 2004. Value, relations, and changing bodies: Privatisation and property rights in Kazakhstan. In: Verdery K, Humphrey C, editors. *Property in Question: Value Transformation in the Global Economy*. Oxford, UK: Berg, pp 251–273.
- Beyer J. 2006. Revitalization, invention and continued existence of the Kyrgyz *aksakal* courts: Listening to pluralistic accounts of history. *Journal of Legal Pluralism and Unofficial Law* 53/54:141–176.
- \* Bichsel C. 2009. *Conflict Transformation in Central Asia: Irrigation Disputes in the Fergana Valley*. Central Asian Studies Series. London, UK: Routledge.
- Bloch PC. 2002. Land reform and farm restructuring in Kyrgyzstan: Almost done, what next? *Problems of Post-Communism* 49(1):53–62.
- Bloch PC, Rasmussen K. 1998. Land reform in Kyrgyzstan. In: Stephen WK, editor. *Land Reform in the Former Soviet Union and Eastern Europe*. London, UK: Routledge, pp 111–125.
- Burawoy M, Verdery K, editors. 1999. *Uncertain Transition: Ethnographies of Change in the Postsocialist World*. Lanham, MD: Rowman and Littlefield.
- Fairbanks CH. 1997. The public void: Antipolitics in the former Soviet Union. In: Schedler A, editor. *End of Politics? Explorations into Modern Antipolitics*. London, UK: Macmillan Press, pp 91–114.
- Farrington JD. 2005. De-development in Eastern Kyrgyzstan and persistence of semi-nomadic livestock herding. *Nomadic Peoples* 9(1/2):171–197.
- \* Gallati J. 2008. *Towards an Improved Understanding of Collective Irrigation Management: A System Dynamics Approach* [PhD dissertation]. Bern, Switzerland: University of Bern.
- Giovarelli R. 1998. *Land Reform and Farm Reorganization in the Kyrgyz Republic*. RDI Reports on Foreign Aid and Development No. 96. Seattle, WA: Rural Development Institute (RDI).
- Hann CM. 1998. Introduction: The embeddedness of property. In: Hann CM, editor. *Property Relations: Renewing the Anthropological Tradition*. Cambridge, UK: Cambridge University Press, pp 1–47.
- Hardin G. 1968. The tragedy of the commons. *Science* 162(3859):1243–1248.
- Haugen A. 2003. *The Establishment of National Republics in Soviet Central Asia*. Basingstoke, UK: Palgrave Macmillan.
- Herbers H. 2006. *Landreform und Existenzsicherung in Tadschikistan. Die Handlungsmacht der Akteure im Kontext der postsowjetischen Transformation*. Sonderband Nr. 33. Erlangen, Germany: Erlanger Geographische Arbeiten.
- Herrfahrdt E, Kipping M, Pickardt T, Polak M, Rohrer C, Wolff CF. 2006. *Water Governance in the Kyrgyz Agricultural Sector: On Its Way to Integrated Water Resource Management?* DIE Studies No. 14. Bonn, Germany: German Development Institute (DIE).
- Humphrey C, Verdery K. 2004. Introduction: Raising questions about property. In: Verdery K, Humphrey C, editors. *Property in Question: Value Transformation in the Global Economy*. Oxford, UK: Berg, pp 1–25.
- \* Ibraimova A. 2009. *Legal and Institutional Framework for Empowerment of Rural Communities in the Kyrgyz Republic*. Etudes et colloques 53. Fribourg, Switzerland: Publications of the Institute of Federalism.
- Kandiyoti D, editor. 2007. *The Cotton Sector in Central Asia: Economic Policy and Development Challenges*. London, UK: School of Oriental and African Studies (SOAS).

- Kangas RD. 2004. Legal reform in Central Asia: Battling the influence of history. In: Burghart DL, Sabonis-Helf T, editors. *In the Tracks of Tamerlane: Central Asia's Path to the 21<sup>st</sup> Century*. Washington, D.C.: Center for Technology and National Security Policy, pp 65–91.
- Koehler J, Zürcher C. 2004. Conflict and the state in the Caucasus and Central Asia: An empirical research challenge. *Berliner Osteuropa Info* 21:57–67.
- Kuehnast K, Dudwick N. 2002. Better a hundred friends than a hundred rubles? Social networks in transition—The Kyrgyz Republic. *World Bank Economists' Forum* 2:51–88.
- \* Liechti K. Submitted. The meanings of pasture and their relevance to negotiations regarding resource degradation: Evidence from post-Soviet rural Kyrgyzstan. Available from Karina Liechti (see Endnote 1 in Chapter 35 by Liechti and Müller on p 559 of the present volume).
- \* Lindberg EE. 2007. *Access to Water for Irrigation in Post-Soviet Agriculture* [MSc thesis]. Zurich, Switzerland: Department of Geography, University of Zurich.
- \* Ludi E. 2003. Sustainable pasture management in Kyrgyzstan and Tajikistan: Development needs and recommendations. *Mountain Research and Development* 23(2):119–123.
- Mirovitskaya N, Soroos MS. 1995. Socialism and the tragedy of the commons: Reflections on environmental practice in the Soviet Union and Russia. *Journal of Environment and Development* 4(1):77–110.
- Obertreis J. 2007. Infrastrukturen im Sozialismus. Das Beispiel der Bewässerungssysteme im sowjetischen Zentralasien. *Saeculum. Jahrbuch für Universalgeschichte* 58:151–182.
- Pomfret R. 2004. Aid and ideas: The impact of western economic support on the Muslim successor states. In: Ro'i Y, editor. *Democracy and Pluralism in Muslim Eurasia*. London, UK: Frank Cass, pp 77–99.
- \* Rohner I. 2007. *National and International Labour Migration: A Case Study in the Province of Batken, Kyrgyzstan*. IP6 Working Paper No. 8. NCCR North-South Dialogue Series. Bern, Switzerland: Swiss National Centre of Competence in Research (NCCR) North-South. Also available at: [http://www.nccr-north-south.unibe.ch//publications/Infosystem/On-line%20Dokumente/Upload/WP\\_finale\\_Irene1.pdf](http://www.nccr-north-south.unibe.ch//publications/Infosystem/On-line%20Dokumente/Upload/WP_finale_Irene1.pdf); accessed on 6 January 2010.
- Sehring J. 2007. Irrigation reform in Kyrgyzstan and Tajikistan. *Irrigation and Drainage Systems* 21(8–9):497–510.
- \* Shigaeva J, Kollmair M, Niederer P, Maselli D. 2007. Livelihoods in transition: Changing land use strategies and ecological implications in a post-Soviet setting (Kyrgyzstan). *Central Asian Survey* 26(3):389–406.
- Sievers EW. 2002. Uzbekistan's Mahalla: From Soviet to absolutist residential community associations. *Chicago-Kent Journal of International and Comparative Law* 2:91–158.
- \* Steimann B. 2008. 'Niemand hier respektiert meine Grenzen' – Konflikte zwischen Hirten und Goldsuchern auf Kirgistans Weiden. *Neue Zürcher Zeitung*, 16–17 February 2008, p 9.
- \* Thieme S. 2007. Osh–Bishkek–Almaty–Moscow and return? How different generations sustain their livelihoods in multilocal settings. *International Migration, Multi-local Livelihoods and Human Security: Perspectives from Europe, Asia and Africa*. The Hague, The Netherlands: Institute of Social Studies (ISS). Also available at: [http://www.iss.nl/content/download/8279/80795/file/Panel%203\\_Thieme.pdf](http://www.iss.nl/content/download/8279/80795/file/Panel%203_Thieme.pdf); accessed on 27 July 2009.
- Thurman JM. 1999. *Modes of Organization in Central Asian Irrigation: The Fergana Valley, 1876 to Present* [PhD dissertation]. Bloomington, IN: University of Indiana.
- Ul Hassan M, Starkloff R, Nizamedinkhodjaeva N. 2004. *Inadequacies in the Water Reforms in the Kyrgyz Republic: An Institutional Analysis*. Research Report No. 81. Colombo, Sri Lanka: International Water Management Institute (IWMI).
- Verdery K. 2004a. The obligations of ownership: Restoring rights to land in postsocialist Transylvania. In: Verdery K, Humphrey B, editors. *Property in Question: Value Transformation in the Global Economy*. Oxford, UK: Berg, pp 139–159.
- Verdery K. 2004b. The property regime of socialism. *Conservation and Society* 2(1):189–198.
- Wanner C. 2005. Money, morality and new forms of exchange in postsocialist Ukraine. *Ethnos* 70(4):515–537.
- Wood EM. 1994. From opportunity to imperative: The history of the market. *Monthly Review* 46:14–40.

