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KYRGYZ REPUBLIC

Country Review

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List of Acronyms

ADB	Asian Development Bank
CACILM	Central Asian Countries Initiative for Land Management
CFM	Collaborative Forest Management
DWR	Department of Water Resources
FAO	United Nations Food and Agriculture Organization
FFS	Farmer Field Schools
GDP	Gross Domestic Product
IFAD	United Nations International Fund for Development
IPM	Integrated Pest Management
NEAP	National Environmental Action Plan
O&M	Operations and Maintenance
RAS	Rural Advisory Service
SAEPF	State Agency on Environmental Protection and Forestry under the Government of the Kyrgyz Republic
UNCCD	United Nations Convention to Combat Desertification
UNECE	United Nations Economic Commission for Europe
WUA	Water Users Association

Kyrgyz Republic Country Review

Executive Summary

The Kyrgyz Republic is a mountainous country with a predominantly agricultural economy. The agricultural sector is the largest contributor to the gross domestic product (GDP), with a 29 percent share in 2006. The forestry sector is estimated to contribute only 0.1 percent of the GDP, as a result of past deforestation. Nevertheless, forests are important to rural livelihoods and play a major role in biodiversity conservation, as well as in soil and water protection.

Priority environmental problems in ***agriculture*** include: inefficient water use, waterlogging, and soil salinization in irrigated lands caused by deteriorated irrigation and drainage systems; and degradation of pasture areas due to overgrazing in more accessible areas and to undergrazing in more remote areas. Other issues include threats of soil pollution and, especially, nitrate contamination of surface water, if farmers are not trained in the proper handling and application of agro-chemicals. Environmental pressures in ***forestry*** are characterized by illegal logging, increased cutting for fuelwood, and overgrazing. Nonetheless, total forest area appears to be stable.

There are provisions for civil society participation in decision-making, including NGO involvement in environmental issues. The main obstacles to the greater public's awareness are: granting of data requests only upon payment of applicable fees; infrequent information dissemination by the media; and limited public participation in environmental impact assessments.

Agricultural and Forestry Policies, Strategies, Programs, and Projects

Agriculture. The Ministry of Agriculture, Water Resources, and Processing Industry is responsible for implementing agricultural policy. Current government efforts address soil protection, pasture management, and water resource management. Some of these support the country's commitments to the United Nations Convention to Combat Desertification (UNCCD), through the Central Asia Countries Initiative on Land Management, and community-based rangeland management in Temir Village. Other projects cover improved water resource management, improved pasture management, rehabilitation of deteriorated irrigation systems, capacity building in government agencies and other stakeholders, and training farmers to use sustainable agricultural practices, including pest prevention and control. Establishment of rural advisory services began under the Agricultural Support Services Project, with World Bank, IFAD, and Swiss support. In 1999, the Kyrgyz Republic established a semi-autonomous Rural Advisory Service, with help from the Kyrgyz-Swiss Agricultural Project. The service, with some capability in sustainability issues, is organized in all *oblasts* (provinces) and operated by farmers.

Forestry. Policy is set by the State Agency on Environmental Protection and Forestry under the Government of the Kyrgyz Republic. The main legal framework for the sector is the 1999 Forest Code, which regulates the efficient use of forest resources, and the reproduction, protection, and conservation of forests. The Forestry Development Concept to 2025 focuses on decentralization and greater involvement of local stakeholders. From 1995 to 2007, a program on Collaborative Forest Management (CFM) was implemented under the Kyrgyz-Swiss Forestry Support Program. The initial focus area was the walnut forests in the southern region but CFM was also adopted in other areas that grow pistachios, almonds, and poplar.

The Extent of Mainstreaming and Its Trends

The main drivers for mainstreaming environmental concerns into broader economic development planning in both the forestry and agricultural sectors include: growing recognition of the environment's

role in the economy and the role of direct users in resource management; active involvement of civil society in environmental issues; national participation in multilateral environmental agreements; and donor-country project partnerships.

Agriculture. Current agricultural policies and programs are appropriately aimed at protecting soils, managing pasturelands and water resources, and supporting the country's commitments to the UNCCD. However, these programs/projects are quite recent and will need time to produce substantial results. Constraints to mainstreaming in the sector include: limited inter-agency coordination; unclear delegation of responsibilities at all government levels; inadequate resource management capacity of government agency staff, limited extension services; and failure to use revenues from grazing fees/taxes to invest in pasture improvement or rehabilitation projects.

Forestry. After gaining independence, the Kyrgyz Republic promoted mainstreaming in the forestry sector through: accession to the Convention on Biological Diversity; strengthening and implementing policies and programs; strengthening institutions through restructuring; setting up donor-country partnerships; and providing economic incentives to support sustainable forest management (e.g., CFM). Yet pressing issues remain to be addressed: more involvement by CFM leaseholders in forest management issues; clarification of CFM concepts and regulations; inadequate coordination and cooperation between ministries and agencies; a need for personnel with updated skills; and inadequate inventories and facilities for monitoring activities. A carbon sequestration initiative was recently discussed.

Priority Needs

• Strengthen institutions in both sectors to increase capacity building in resource management, promote effective inter-ministerial coordination, improve monitoring systems, take a forest inventory, and strengthen extension services.
• Improve governance in both sectors: clarification of roles and responsibilities; transparency when making decisions on sustainable land and forest management; transparency in the use of revenues collected from grazing fees and taxes; and greater involvement of local users/stakeholders.
• Further investment in land and soil management; pasture and rangeland management; and irrigation and drainage systems, all with a focus on sustainability and resource conservation.
• Further investment in reforestation and afforestation projects, including community management, and taking carbon sequestration possibilities into account.

Kyrgyz Republic Country Review[1]

Part 1: Assessment

1.1. Socioeconomic and Geographic Context[2]

The Kyrgyz Republic is a landlocked country on the eastern part of the Central Asia region, bordered by Kazakhstan in the north, China in the east, Uzbekistan in the west, and China and Tajikistan in the south. It has a land area of 19.18 million ha. The country's topography is dominated by sharp mountain peaks and valleys, and considerable areas are covered by glaciers. About 94 percent of the terrain is 1,000 m or more above sea level, and 30 percent of the country is higher than 3,000 m above sea level. The only relatively flat regions are the Kyrgyz part of the Fergana Valley, in southwestern Kyrgyzstan, and the Chu and Talas valleys along the northern border. The climate is continental with considerable variation between regions. Lower mountain slopes have a dry continental climate, as they receive desert-warmed winds from Kazakhstan and Uzbekistan, whereas the highest mountains have a polar climate.

Of the Central Asian countries, the Kyrgyz Republic is the richest in water resources. The Republic's hydrological links are important since, as an upstream country, more than 3,500 rivers find their headwaters in the territory and almost all flow to neighboring downstream countries. The rivers belong mainly to the Syr Darya and Amu Darya basins. Water resources are crucial for irrigation but also used to produce hydroelectric power. In 2003, about 93 percent of electricity was produced from hydroelectric sources; the remaining 7 percent was from natural gas and coal sources.

In 2005, forest covered only 4.35 percent of the total land area, roughly half the area it covered 70 years ago. Forests in northern Kyrgyz are characterized by fir, poplar, and willow, while mixed forests with walnut, maple, apple, cherry plum, hawthorn, and almond trees grow in the south, where the climate is drier. Forests have a key role in maintaining biodiversity.

The Republic is principally an agricultural economy. Fifty six percent of the total land area is used for agricultural purposes (FAO 2006a). Most of the terrain is too mountainous to grow crops but higher-elevation pastures support livestock raising. In 2003, permanent pastures accounted for about 48 percent of total land area and 87 percent of total agricultural area. Sustainable pasture management to prevent degradation is critically important and requires improving the division of management responsibilities among various government entities.

The economy has shown positive growth since 1995. The real gross domestic product (GDP) in the Kyrgyz Republic was about US$1.64 billion in 2005, and about $319 per capita. Real GDP and real per capita income have grown annually at an average of 4.7 percent and 3.5 percent, respectively, since 1996. The agricultural sector has made a significant contribution to the country's economic recovery since the transition. In 2005, it accounted for more than one-third of real GDP, and in the past 15 years its growth has shown a general increasing trend (Figure 1). The sector also employs more than 40 percent of the economically active population. It should be noted that there are economic disparities between more economically dynamic regions such as Bishkek, the capital, and surrounding areas, and remote rural regions in the southern and central parts of the country (Fisher et al. 2004).

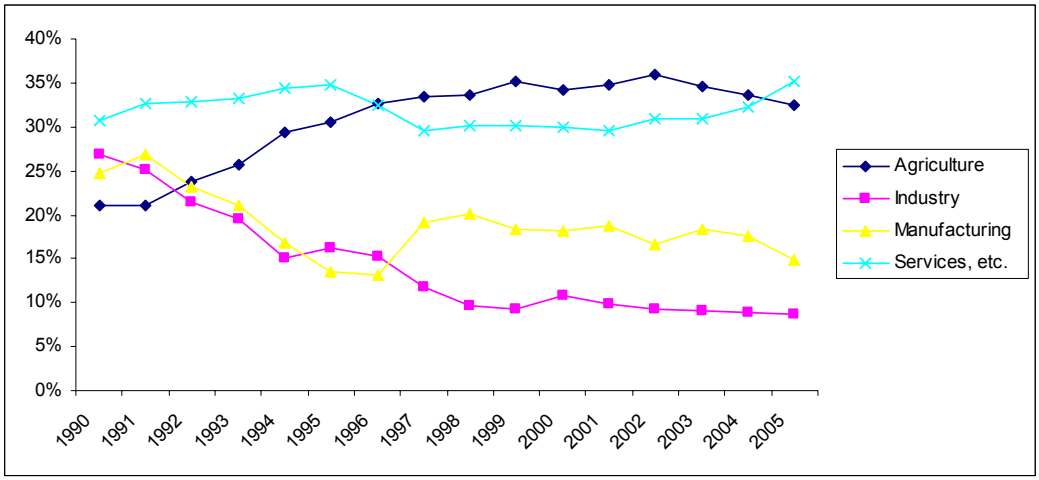
[1] In addition to the sources cited in this review, the document draws heavily on an internal World Bank report by local consultant Baktybek Koichumanov.

[2] Sources of data on geography and natural resources are Koichumanov, NWG of Kyrgyz (2002), ADB (2004), FAO (2006a-b), Fisher et al. (2004), LOC (2005), UNECE (2000) and World Bank (2005a, 2006a).

Total population of the Kyrgyz Republic in 2005 was estimated at about 5.2 million, with a population density of 27 people per square kilometer. Sixty four percent of the population lives in rural areas. The average annual population growth rate was about 0.96 percent between 2000 and 2005. The population is concentrated in small areas in the north and southwest in the Chu (north-central), Fergana (southwestern), and Talas (northwestern) valleys (Fisher et al. 2004, LOC 2005).

Like other EECCA countries, the Republic has a well-educated population. Most of the country's labor force works in the agricultural and service sectors (43 percent and 42 percent, respectively in 2003). As for poverty levels, the proportion of population in absolute poverty (below $2.15 per day) has decreased (World Bank 2005b). However, the poverty incidence in Kyrgyz is high compared to middle income CIS nations (Kazakhstan and Russia) and others within its income group (Armenia, Moldova, and Uzbekistan).[3] Access to safe water is also below the European and Central Asian average.

Figure 1: Contribution of Economic Sectors to Real GDP, Kyrgyz Republic, 1990-2005



Source: World Bank (2006a).

Table 2: Kyrgyz Republic Socioeconomic Indicators and Selected Development Indicators, 2000-2005

Indicators	Unit	1990	1995	2000	2005
Poverty rate					
National	% of population living below	--	--	78	74 (2001)
Capital	$2.15/day	--	--	11	9 (2003)
Urban		--	--	30	28 (2003)
Rural		--	--	70	72 (2003)
Access to safe water	% of total population	78.00	--	--	77.00 (2004)
(ECA Region)	with access	(92.59)	--	--	(91.91) (2004)
Real GDP, at 2000 US$	billion US$	2.06	1.04	1.37	1.64
Per capita	US$ per person	464.91	227.15	278.66	318.53
Real value added					
Agriculture	% of real GDP	21.00	30.44	34.23	32.44
Industry	% of real GDP	51.78	29.62	28.83	23.64
Manufacturing	% of real GDP	24.83	13.45	18.10	14.92
Services, etc.	% of real GDP	30.71	34.75	29.97	35.20

Sources: World Bank (2005b, 2006a).
Notes: All latest data are as of year 2005, unless mentioned otherwise; "—" means no data available.

[3] See Figure 1.2 and Appendix Table 2 of World Bank (2005b) for more details. Assessed at $2.15/day, poverty rate in Kyrgyz Republic was 70% in 2003 compared to 21% in Kazakhstan, 50% in Armenia, 43% in Moldova, and 47% in Uzbekistan.

Reform in the agricultural sector started in 1992. Some 71 percent of arable land was managed by private farms in 2002. Pasture and forest areas, however, are still owned and managed by the State. In particular, distant pastures are managed by the *oblast* (province), while pastures near villages are managed by authorities at the *rayon* and village levels. Forests, on the other hand, are primarily used for conserving soil, water, and biodiversity resources. Mountain communities depend on pasture and forest resources for income and subsistence—i.e., pastures for small-scale livestock production, fuelwood for household energy needs, non-timber forest products for medicine, income, and food. Local villagers and *leshoz* (forest enterprise) members collect medicinal plants and sell them at local and regional markets and to processing companies in Bishkek. The forestry sector is estimated to contribute only 0.1 percent of GDP. Nevertheless, the resource is important to rural livelihoods and, as mentioned above, has a major role in natural resource conservation.

The agricultural sector has strong potential for exporting commodities and processed goods, but several challenges need to be addressed to improve domestic and international competitiveness. These include weaknesses in the agricultural policy and land distribution system resulting in fragmented farming communities and reduced efficiency in responding to market demands; poor access to basic farm inputs and new technologies; and high cost of credit and inadequate technical and market knowledge that hinder investments in new technologies (World Bank 2005a). Other factors that could improve competitiveness are long-term sustainability of tree crops; provision of technical assistance to farmers by agro-processing industries to increase consistency in the supply of high quality raw materials; and organic certification of tree crops and vegetables (World Bank 2005a).

1.2. Agriculture and Forestry Development Trends

1.2.A. Agriculture

In 2003, the area used for agricultural purposes was about 10,730 thousand hectares, of which 12.2 percent was arable land, 0.5 percent permanent crops, and 87.3 percent permanent pastures (FAO 2006a). The Kyrgyz Republic is a major exporter of cotton lint, with about 37 percent share of agriculture's total export value in 2004. Other primary exports include tobacco and refined sugar. There was a general increasing trend in the value of agricultural exports between 1999 and 2004; however, their share in total exports has been diminishing since then.

Agricultural sector reform was initiated in 1992 and accelerated in 1994. Private farms have emerged as the main driving force of agricultural GDP growth, with 59 percent contribution to the agricultural GDP in 2002. A recent World Bank study showed that the contribution of private farms grew at an average annual rate of 20 percent in 1996-2002. In contrast, the contribution of household plots and agricultural enterprises declined over the same period (World Bank 2004).

A study by Csaki et al. (2006) summarized the status of agricultural reforms in the Kyrgyz Republic in 2005. In brief, the study identifies the following:

- The Republic is ahead of other EECCA countries on privatization and reform. Most arable land has been privatized.
- Markets, prices, and the trade regime are liberalized, and market structures are gradually developing, though new private enterprises are not very efficient, and access to credit is limited.
- Substantial parts of the irrigation and drainage infrastructure have been or are being transferred to water users associations (WUAs).
- Institutions of a "planned" economy are gradually being replaced by institutions that serve private agriculture based on market principles. However, the agricultural research and education systems have not yet adapted to emerging market conditions; institutional capacity to undertake agricultural policy analysis is limited; and the Department of Water Resources (DWR) needs to be restructured.

Most pastures are located at 1,000 to 3,500 m, and 25 percent are above 3,500 m. In 2003, the total area of permanent pastures was 9.365 million ha, in three zones: (1) *summer pastures,* with three to four months of grazing period, found at elevations above 2,500 m and on slopes dominated by grasses; (2) *spring* or *fall pastures*, also called intensive pastures, are dominated by fescue grasses, *Artemisia*, and herbaceous legumes, and found at elevations from 1,500 to 2,500 m; and (3) *winter pastures* or *near pastures*, often located below 1,500 m. The three zones account for approximately 45 percent, 32 percent, and 23 percent of total pasture area, respectively (Brylski et al. 2001, Penkina 2004). Spring/fall pastures are heavily used, especially when mountain pastures are covered by snow. However, winter pastures are more threatened by overgrazing because they are typically near human settlements. Provided there is sound rangeland management, it has been estimated that Kyrgyz pastures could contribute an additional $100 million annually to the economy (Brylski et al. 2001). According to the Land Code of the Kyrgyz Republic, all pastures are the property of the State. Remote rangelands, mainly summer pastures, are managed by the *oblast*, while rangelands located nearer to towns and villages are managed by the *rayon* and village governments. User rights can be granted by the State in the form of annual leases. Revenues obtained from grazing fees and taxes are not invested in pasture management and rehabilitation projects.[4]

Annex Figure 1 shows the main agencies concerned with environment, agriculture, and forestry in the Kyrgyz Republic. The Ministry of Agriculture, Water Resources and Processing Industry (MAWRPI) is the state body responsible for the implementation of agricultural policy in the Kyrgyz Republic. In the absence of an entity responsible for soil conservation in the State Agency on Environmental Protection and Forestry, the Main Ecological Inspectorate is in charge of preventing soil contamination and illegal forest cutting, and generally contributes to the enforcement of land legislation. The Environmental Monitoring Department of the State Agency monitors the environment, particularly the state of soils (UNECE 2000). In 2005, 4 percent of the national budget was allocated to MAWPRI but this was reduced to 3.3 percent in 2006. More than half of theState Agency's funds are allocated to water resources. The Pasture Monitoring and Protection Unit of the Kyrgyz Land Management Institute and Pasture Research Institute (financed by the state budget) is responsible for monitoring rangelands.

The general institutional framework in the agricultural sector faces challenges such as unclear delineation of roles among national agencies and downstream government bodies, inadequate management capacity, shortage of trained personnel, and non-transparent decision-making processes. Furthermore, there is little cooperation and virtually no coordination among the agencies involved.

Rural advisory services began as a project component of the Agricultural Support Services Project (see Part 2). In 1999, the Kyrgyz Republic established a semi-autonomous Rural Advisory Service (RAS) with help from the Swiss Agency for Development and Cooperation through the Kyrgyz-Swiss Agricultural Project. RAS is locally organized in all *oblasts* and operated by farmers. It provides training and advice on such key issues as crop production, soil fertility, and livestock breeding. Agricultural research and education need to be updated and re-oriented to serve the needs of farmers, and extension services need to be scaled up (based on lessons from past successes and failures) to reach as many farmers as possible. Research and extension coordination is essential to effective technology/knowledge transfer to farmers. Another challenge faced in providing extension services is sustainability after the donor-supported projects have been completed, i.e., how to cover the recurrent financial costs associated with these services.[5]

[4] Sources: Koichumanov (2007), Brylski et al. (2001).

[5] Some of these concerns are indicated in Schmidt (2001), World Bank (2003a, 2004) and in the Farmer Ownership Survey conducted under the ASSP (World Bank 2007b).

1.2.B. Forestry

As of 2005, forest cover was estimated at 4.32 percent of the total land area (World Bank 2006a). The forest's natural diversity is of four main types: (1) spruce forests found in the eastern and central parts of the country and in the ranges north of the Fergana Valley; (2) walnut-fruit forests in the northern and northeastern slopes of the Fergana mountain ridge, of global biodiversity significance since the area it covers is the largest worldwide; (3) juniper forests growing under arid conditions and dispersed over the country; and (4) riverside forests. Poplars are planted near or within settled areas for timber production for construction and as windbreaks (Fisher et al. 2004). Forest area and volume increased between 1998 and 2003. Forests are primarily for biodiversity conservation and soil and water protection, rather than timber production. All forests are owned by the state and form the "State Forest Fund," comprised of forest lands and lands not covered by forest but earmarked for forestry needs (e.g., mountain grasslands). As of 2003, the State Forest Fund covered 3.2 million ha.

Forest management has undergone recent structural reforms. The State Forest Service (SFS), established in November 2001 based on Presidential Decree No. 342, is responsible for forest policy implementation, forest management, hunting, management of national parks and other protected areas, and biodiversity conservation. The SFS engages in other activities, such as community-based forest management, locally important industrial silviculture, and forest regeneration. In October 2005, the SFS and the ecological block of the Ministry of Emergencies were consolidated into the State Agency on Environmental Protection and Forestry under the Government of the Kyrgyz Republic (SAEPF) , by Presidential Decree No. 462. Recognition of the linkages among forestry, biodiversity conservation, and environmental protection drove the formation of this unified agency.

Forest administration units are responsible for forest management at the *oblast* level. At the local level, state forest enterprises or *leshozes* are responsible for forest protection and implementing forest management plans. More than forty *leshozes* report to the *oblast* forest administration in charge of protecting and managing forests (Fisher et al. 2004, FAO 2006b). *Leshozes* may also lease access to non-timber forest products, for example, to allow people into walnut-fruit forests to collect fuelwood, obtain agricultural plots, and gather hay, walnuts, or fruit to sell (Brylski et al. 2001).

Oversight and coordination of implementation of the Republic's obligations to international environmental agreements, however, are inadequate. Other concerns include poor forest inventory and inadequate funds to support monitoring activities, inadequate numbers of skilled personnel, and poor information exchange, as there are no inter-agency or inter-sectoral cooperation mechanisms. Responsibility for environmental protection is shared by a number of central state bodies (see Annex I). A draft resolution for establishing a national council for sustainable development that would bring together the different ministries, state agencies, and other stakeholders has been submitted by the SAEPF and is under review.

1.3. Environmental Impacts of Agriculture and Forestry

1.3.A. Agriculture

Land degradation is caused by natural factors, anthropogenic activities, or a combination of both. In the Kyrgyz Republic, priority soil-related problems are: (1) soil degradation, including soil fertility depletion, and soil erosion and salinity due to deteriorated irrigation systems and inefficient water use; and (2) rangeland degradation due to overgrazing and poor pastureland management (UNCCD 2006). Trends by major types of land degradation at the national level are presented in Table 2. From 1985 to 2002, areas subject to all types of degradation increased, but the biggest increase was in wind- and water-eroded lands.

Table 1: Degraded Agricultural Land, by Major Types of Degradation (000 ha), 1985-2002

Type of degradation	1985	1990	2000	2002
Salinized	666.3	1,170.3	1,180.8	1,180.8
Solonized*	243.4	469.3	471.2	471.2
Waterlogged	28.9	89.2	90.9	118.6
Rocky**	2,397.4	3,808.8	3,808.8	4,021.2
Wind-eroded	616.2	5,475.3	5,475.3	5,689.8
Water-eroded	725.7	4,544.8	5,626.8	5,626.9

*with high salt content; **characterized by severe loss of vegetation.
Sources: National Framework Program on Steady Management of Ground Resources (2005); UNCCD (2006).

Waterlogging and soil salinization. On-farm canals, inter-farm canals, and drainage networks have been reported as deteriorated due to lack of funding for maintenance and repair. State budget funds are insufficient, only 25-30 percent of the amount required. Deteriorated irrigation and drainage networks have resulted in the decline of irrigated land use and water use efficiency. For instance, a 2002 study on irrigated areas in the Kyrgyz part of the Aral Sea basin reported an irrigation system efficiency coefficient of 58 percent, on average (NWG of Kyrgyz 2002).

Defective irrigation and drainage systems are detrimental to soil. Soils have a natural salt content, and almost all water contains dissolved salt. When plants use water, salts are left behind in the soil and begin to accumulate. These salts need to be leached out from the plant root zone by applying additional water, otherwise plants will have a problem absorbing moisture as the soil becomes more saline. However, with poor irrigation, too much water is released too quickly, which can make the water table rise, and with poor drainage, saline groundwater is not adequately leached out of the root zone.

Irrigated lands in the Kyrgyz part of the Aral Sea basin have different degrees of soil salinity (Table 3). Severe soil salinization is experienced in four zones: the Upper Naryn, North Fergana, Kampyr-Rayat, and South Fergana. In general, however, irrigated lands suffering salinization (different degrees) are located in the Upper Naryn and South Fergana. Drainage networks in the area do not lower the groundwater level sufficiently, which leads to secondary salinization of irrigated lands (NWG of Kyrgyz 2002).

Table 3: Salinized Irrigated Lands in the Kyrgyz Part of the Aral Sea Basin (by degree of salinity), 2000*

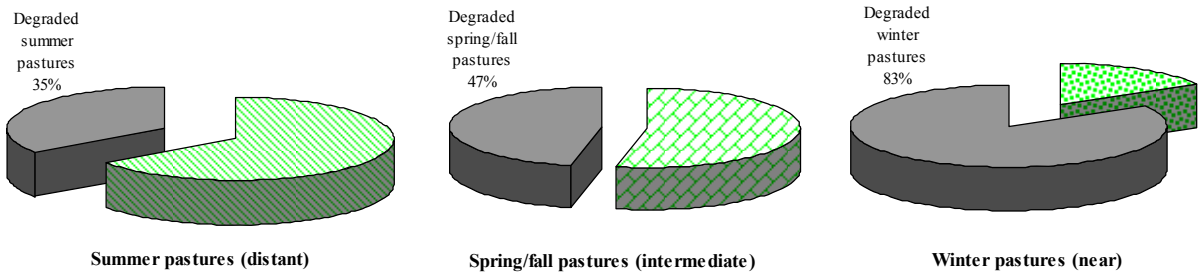
Zone	Irrigated area (ha)	Area by degree of soil salinity (ha)**				
		Slight	Moderate	Severe	Total	Total as % of irrigated area
Upper Naryn	92,742	6,047	2,953	3,144	12,144	13.1
Mid-Naryn	17,691	0	0	0	0	0.0
North Fergana	104,388	2,548	317	0	2,865	2.7
Chatkal	7,061	0	0	0	0	0.0
Kampyr-Ravat	27,865	796	62	42	900	3.2
South Fergana	158,285	3,326	1,299	586	5,211	3.3
Alay	15,868	0	0	0	0	0.0
Total in basin	423,620	12,717	4,631	3,772	21,120	5.0

Source: NWG of Kyrgyz (2002).
* Data as of January 1, 2000; ** Soil salinity level measured within 0-1 meter of soil's top layer.

Overgrazing. Rangelands have been heavily grazed since the Soviet era, particularly those outside nature reserves. Under the Soviet system, the grazing system was regional, and local Soviets

(councils) managed and organized large-scale seasonal movements of livestock. Seasonal migration was organized between summer pastures in the Kyrgyz Republic and winter pastures at lower elevations, not only within the Republic but also in Kazakhstan and Uzbekistan. Kazakh and Uzbek herders also use the Republic's summer pastures (Brylski et al. 2001). Since independence, the livestock sector has undergone a difficult transition. Livestock numbers in the country have declined considerably due to many factors, including division and privatization of state-owned flocks, inadequate capital of farmers/herders to care for flocks and provide winter feed, less access to credit, less technical support for herders, and deteriorated rural infrastructure, especially in mountain regions (e.g., roads, watering points). Degradation of pasturelands, however, has persisted despite the decline in livestock numbers. Figure 3 shows degradation levels in three types of pastures. More winter pastures or those close to settlements are degraded than summer and spring/fall pastures. Degraded areas are characterized by growth of non-forage species or weeds, topsoil erosion, and occasional mudflows.

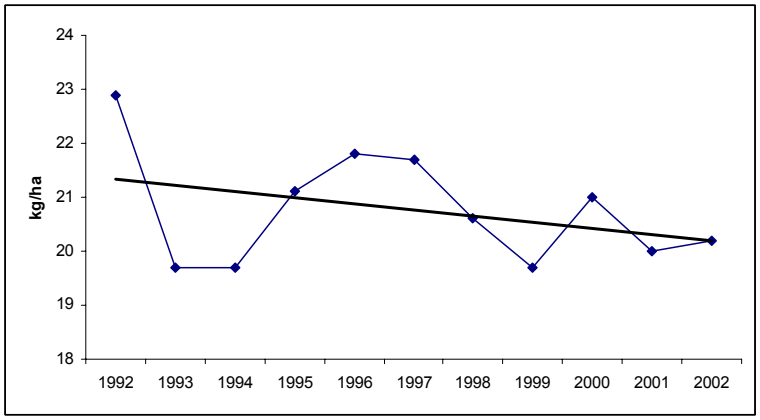
Figure 2: Degraded Pasture Areas in Kyrgyz Republic, by Seasonal Pastures



Source: Penkina (2004).

Pollution from use of chemicals. Both fertilizer and pesticide use intensities have declined in the Republic, though less so than in other EECCA countries. Fertilizer use per hectare of arable and permanent cropland dropped from 22.9 kg/ha in 1992 to 20.2 kg/ha in 2002, and is generally declining (Figure 4) (WRI 2007). Pesticide use, on the other hand, declined from 5.2 kg/ha in 1980, to 1.4 kg/ha in 1994, to 0.3 kg/ha in 1998. These reductions are good for the environment. For instance, in 1999, the Ministry of Health's Department of Sanitary-Epidemiological Control reported that pesticide concentrations in food have decreased, as have nitrate and nitrite concentrations in surface waters (caused by chemical runoff from the field) (UNECE 2002). However, it is critical to strengthen extension service capacity on sustainable plant protection measures, given that most farmers are not trained to properly apply, store, or dispose of agrochemicals. There is also a need to build up the capacity of the Department of Sanitary-Epidemiological Control to monitor and control the quality of agrochemicals and their application.

Figure 3: Fertilizer Use Intensity, 1992-2002



Source: WRI (2007).

1.3.B. Forestry

Forest resources in the Kyrgyz Republic have been subject to human pressures, particularly illegal cutting and use of forest wood for fuel. Fuelwood collection has been reported as rampant in the southern region of the country and in more accessible areas (Saigal 2003). Unfortunately, there are no recorded data that show the extent of damage from these activities. FAO statistics show no significant change in forest cover since 1990, which suggests that deforestation is not a problem at the national level. However, the problem is experienced locally; for example, it was reported that juniper forests in the south were shrinking 0.7 to 0.9 percent annually (Brylski et al. 2001), though this trend now appears to have been reversed. Overgrazing of mountain pastures has also contributed to depletion of forest cover. These anthropogenic pressures reduce vegetation cover and weaken watershed protection provided by the forest, which, in turn, intensifies the risk of soil erosion, landslides, downstream flooding, and sharp fluctuations in river flows.

There are also institutional pressures, such as a weak legislative and regulatory regime, poor institutional capacity to manage and monitor forests, and insufficient development of ecologically sound economic incentives, for example, ecological tourism, reduction of the cost of electric power, development of local power supplies, and provision of resources for forest regeneration (UNCCD 2006). The government's financial capacity to invest in reforestation projects is also limited. As resource degradation continues, the cost of restoring it will also continue to increase.

1.4. Agricultural and Forestry Policies, Strategies, Programs, and Projects[6]

The National Environmental Action Plan (NEAP), adopted in 1995, has been instrumental in developing environmental laws and regulations in the Kyrgyz Republic. It provided a comprehensive evaluation of the environmental and natural resource management challenges facing the country and identified environmental priorities, including inefficient water resource management, land degradation (mainly due to overgrazing), and overexploitation of fragile forest resources. Action plans were identified in the NEAP but now need to be updated and integrated into current programs.

Another national program is the Comprehensive Development Framework [check translation] to 2010 (CDF), approved in 2001, which sets long-terms goals related to improving the political, social, and economic situation of the Republic. It identifies the environment as one of fourteen key development subjects in the country that warrant attention from both the government and society. There is a short section on environmental protection under CDF's "safe development" objective, that mentions land degradation, water resource and irrigation management, and biodiversity conservation. This environmental concern is also reflected in the National Poverty Reduction Strategy 2003-2005.

After the political changes of 2006, there followed administrative restructuring and amendment of the Constitution, as well as new country and sector policy development strategies (including agriculture), where state authorities and other stakeholders took part. An example is the Country Development Strategy for 2006-2010, approved by Government Resolution No. 760 (November 6, 2006) and sent to parliament for ratification. In its section on "ecological safety," the Strategy notes the following priorities: (1) improvement of the ecological policy and legal foundation, including economic mechanisms for nature management; (2) environmental monitoring; (3) simplification of the permit system for nature management; (4) enforcement of environmental regulations; (5) establishment of protected nature reserve networks; (6) biodiversity conservation and forest rehabilitation; and (7) rehabilitation of degraded

[6] Sources for this section: Koichumanov (2007), ADB (2004), SAEPF (2005), UNCCD (2006), and websites of international environmental conventions.

ecosystems and measures to prevent degradation. There appears to be limited political support, however, for ecological improvement, as the government focuses more on boosting economic activities. A very small amount of the country's GDP is allocated for environmental protection—only 0.03 percent.

A number of agricultural and forestry policies, strategies, and programs are discussed below. The Kyrgyz Republic is party to multilateral environmental conventions such as the Convention on Biological Diversity (1996), United Nations Convention to Combat Desertification (1997), Aarhus Convention on Access to Environmental Information (2001), United Nations Framework Convention on Climate Change (2000), Kyoto Protocol (2003), and the Stockholm Convention on Persistent Organic Pollutants (2006). Sectoral programs have been developed to support the country's obligations to some of these agreements.

1.4.A. Agriculture

Soil protection, water resource management, and pastureland management. The Agrarian Policy Concept of Kyrgyz Republic to 2010[7] was approved to guide the effective and timely completion of land and agrarian reforms, as well as the implementation of the main provisions of the CDF. The Concept addresses environmental issues related to soil, water, and pasture resources through the following strategies:

- Soil protection by restoring and maintaining soil fertility, through the development of correct application of chemical and organic fertilizers;
- Rationalization of pasture resource management, comprehensive pastureland assessment, estimation of the optimum loads or carrying capacity of pastures, establishment of principles for using and protecting pastures; and
- Reform and development of water relations to strengthen water resource security, by decentralizing water management to basin, territorial, and municipal levels, and to the private sector.

On water resources, the government has approved a portfolio of measures under the project Water Resources Development in the Kyrgyz Republic to 2010.[8] Its key activities include: creation of a market for water, rehabilitation of water infrastructure, reclamation of irrigated areas, and establishment of water user associations (WUAs). Funding required to implement these activities is estimated at 5,437.11 million Kyrgyz Som, 34 percent of which is expected to come from the national budget, 11 percent from local budgets, and 54 percent from foreign donors/investments.

Integrated pest management.[9] A pilot IPM program, one of the components of the ASSP, focuses on "integrated crop management" rather than simply IPM. The pilot IPM program, which completed its fourth season in February 2007, uses the Farmer Field Schools (FFS) methodology (see Part 2 for more details).

Degradation of cropland and pasture areas is also addressed by programs and projects supported by international donors, in partnership with the national government, for example, the Central Asian Countries Initiative on Land Management (CACILM)[10] on sustainable agriculture (rainfed and irrigated lands) and sustainable pastureland management. CACILM is a multi-country, multi-donor partnership that supports the development of a national programmatic framework to combat land degradation (and

[7] Government Resolution No. 465 (June 22, 2004).
[8] Government Resolution No. 133 (March 17, 2005).
[9] World Bank (2006e, 2007b).
[10] CACILM is implemented in five Central Asian countries: Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan. In partnership with the national government, international organizations involved in the program are the Asian Development Bank (ADB), Canadian International Development Agency (CIDA), Convention to Combat Desertification Project of the GTZ, Global Mechanism of the UNCCD, International Center for Agricultural Research in Dry Areas (ICARDA). International Fund for Agricultural Development (IFAD), Swiss Development Cooperation (SDC), United Nations Development Program (UNDP), and the United Nations Environment Program (UNEP). The World Bank is currently in the process of joining the partnership. See http://www.adb.org/Projects/CACILM/.

desertification) by promoting comprehensive approaches to sustainable land and water management. The "sustainable agriculture" program area includes two projects on arable land (organization of cooperatives and introduction of crop rotation for improvement of fertility of arable lands; and protection of arable land and pasture from choking by weeds and combating agricultural pests), and three projects on irrigated land (reduction of degraded irrigated lands, management of irrigation schemes at the WUA level, and mudflow and flood protection of productive land). The "sustainable pasture management" program area has four projects: balanced development of livestock breeding in outrun pastures; mountain pasture management; sustainable dryland management through mobile pastoral custodianship; and interruption of the poverty-land degradation cycle for mountain populations. CACILM will be implemented over a period of 10 years, from 2006 to 2016 (UNCCD 2006).

Other examples of sectoral projects on land degradation funded by international organizations are: Community-based Rangeland Management in Temir Village (2005-2007) supported by CIDA, UNDP, and the Global Mechanism of UNCCD; and Sustainable Use of Natural Resources in Semi-arid Mountainous Regions (2002-ongoing) financed by BMZ. There are also past, on-going, and forthcoming World Bank projects that cover pasture management, irrigation and drainage rehabilitation, pest management, and capacity building of authorities and farmers, among others (see Part 2). For instance, the Sheep and Wool Improvement Project (1996-2002) helped to develop mechanisms for rangeland tenure at the community level; under this project, about 343,000 ha of unfertile pastures were withdrawn from use.

The World Bank Irrigation Rehabilitation Project (1998-2006) and On-farm Irrigation Project (2000-2008) include not only rehabilitation of the irrigation infrastructure but also capacity building of the Ministry of Agriculture and Water Resources and WUAs. A new project on irrigation rehabilitation and modernization, the Water Management Improvement Project (2006-2011), focuses more on institutional (and financial) reform relating to infrastructure investments. Two Asian Development Bank projects have similar aims. The World Bank Agricultural Support Services Project (ASSP)(1998-2007) includes components focusing on crop protection and rural advisory services for farmers. The Land and Real Estate Registration Project (2000-2007) is expected to provide land tenure security that will strengthen farmers' incentive to sustainably use the resource.

A planned *Agricultural Investments and Services Project* in the World Bank program would focus on pasture management and improvement, using stakeholder involvement to develop community pasture management plans. It would also strengthen and expand advisory services to farmers and herders, especially on animal health and nutrition.

Extension services. To date, establishment of agricultural extension services has been mainly through donor projects. An example is the Kyrgyz-Swiss Agricultural Program (KSAP)[11], which provides technical and financial assistance to RAS in all *oblasts*, and addresses soil fertility. The KSAP provides a participatory structure for farmers and rural advisors to determine priority needs and actions. Several World Bank projects provide extension services to farmers. The ASSP has established RAS that extended to 55 percent of all villages in the country as of 2006. Future financial support from external donors will be earmarked for funding programs on soil fertility management, IPM, and animal husbandry. The proposed Second On-Farm Irrigation Project plans to support extension services to advise on the proper application of fertilizers and pesticides, as well as provide training and advice on improved on-farm soil and water management to address soil erosion issues.

[11] Financed by the Swiss Agency for Development and Cooperation (SDC), International Fund for Agricultural Development, and the government of Kyrgyzstan. For more details, project description is available at: http://www.swisscoop.kg/en/Home/Activities_in_Kyrgyzstan/Agriculture.

1.4.B. Forestry

The 1999 Forest Code, the main legislation for the forest sector, regulates the efficient use of forest resources and the reproduction, protection, and conservation of forests (UNECE 2000). It outlines forest protection measures to be implemented by both forest management authorities and resource users. The Code gives forest resources an exceptional conservation status due to their critical role in general nature protection. Thus commercial logging is prohibited; the only logging activities allowed are those related to sanitary and forest management. These require State permits, which are given to individuals for leased forest areas and other uses, such as grazing, haymaking, hunting, mushroom picking, and recreation.

Based on the Forest Code, the National Forest Program for 2001-2005 aimed to gradually decentralize management and included forest reproduction activities in deforested, mudflow-prone watersheds, and eroded areas. Within five years, 16,000 ha were reforested.

While the Forest Code defines the legal framework in forestry, the Forestry Development Concept to 2025 defined the policy framework. The Concept aims to achieve forest sustainability and to promote the involvement of local communities in joint forest management. By 2007, within the Kyrgyz-Swiss Forestry Support Programme, activities focused initially on relict nut trees in the south but latr expoanded to cover other regions, covering pistachios, almods and poplars. Together the Forest Code and Concept support the implementation of the Convention on Biodiversity (SAEPF 2005) and provide an enabling framework for forest conservation and use.[12] To implement the Concept and based on the assessment of the National Forest Program 2001-2005, the new National Forest Program for 2005-2015 was approved in November 2004. . The National Forest Development Action Plan for 2006-2010 will implement the first five years of the new Forest Program. Its goal is to promote sustainable forest development through the involvement of local communities and collaborative management.

The amendment of the Forest Code and development of the latest Forestry Development Concept were achievements under the Kyrgyz-Swiss Forestry Support Program (KIRFOR). They focused on the southern region of the Kyrgyz Republic because it has the largest natural growth walnut forest in the world and is under strong environmental pressure from local communities who greatly depend on the resource for income (Fisher et al. 2004). Collaborative Forest Management (CFM) has been adopted more widely as a national program by the Kyrgyz government and is supported by Decree No. 377 (July 27, 2001). The number of CFM leases has grown rapidly and now accounts for more than 16,000 ha (Fisher et al. 2004, Carter et al. 2003). Such leases benefit the lessees through forest products, but also the state through afforestation. For instance, individuals (or households) are allowed to harvest walnut fruits in exchange for planting walnut seedlings provided by *leshozes* (Brylski et al. 2001).

Although CFM has demonstrated a more participatory approach to decision-making, there are issues of concern such as the actual degree of participation by leaseholders in planning and decision-making, still controlled more by the *leshozes*. Also, CFM has been adopted widely in different forest types and areas, but the concept and regulations need to be further clarified to avoid misinterpretation and violations.

[12] The Concept was initially implemented in 1999 and revised in 2003 to focus on decentralization and greater involvement of local stakeholders. It is founded on three cornerstones: the "forest" that needs to be protected by sustainable forest management techniques; the "people," whose involvement in forest management should be strongly promoted; and the "State," which will serve primarily as a coordinator of various needs.

1.5. Public Awareness and Access to Information on Environmental Issues[13]

The Kyrgyz Republic acceded to the Aarhus Convention on May 21, 2001.[14] An Accession Law to the Convention was passedin 2000. Concrete efforts in the Republic ensure access to environmental information, such as laws that support dissemination of information and the information networks of NGOs. The right to environmental information is also stipulated in environmental laws, including those on air protection, water, and radioactive safety.

Civil society organizations have emerged and grown in the Republic only since independence (UNECE 2000). According to a recent environmental assessment conducted by the ADB, the country is the most open to civil society participation in decision-making within Central Asia. Many NGOs, such as Independent Environmental Expertise and Ecoguide, have participated in debates on environmental policy and played a role in developing environmental laws (ADB 2004, FAO 2006b). The NGOs provide a wide range of services: participation in policy formulation, monitoring, scientific studies, advocacy, and education.

Ministries and agencies are obliged to provide environmental information to interested parties (e.g., the public and NGOs) under the Environmental Protection Law. The State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic is responsible for disseminating ecological information, currently with the help of NGOs through public awareness campaigns, weekly radio broadcasts, and monthly TV programs.

The main obstacles to the public's awareness and role in environmental decision-making are: granting of data requests only upon payment of applicable fees; lack of funding, which restricts provision of educational/training materials to schools and other interested parties; infrequency of information dissemination by the media; lack of clarity in the Environmental Protection Law as to which agencies will provide environmental information; and limited public participation in environmental impact assessment.

1.6. The Extent of Mainstreaming and Its Trends

The growing recognition of the environment's role in the economy and the role of direct users in resource management, as well as the active involvement of civil society in environmental issues, have served as drivers to mainstream environmental concerns into Kyrgyz Republic's broader economic development planning, and into sectoral plans and programs. On-going and recently implemented national programs have provisions for environmental protection, but they are not as high a priority as the targets for enhancing economic activities. Other key drivers for mainstreaming include national participation in multilateral environmental agreements, donor-country project partnerships, and implementation of government legislation to support wider adoption of piloted innovations.

Current policy and programs in agriculture are well directed in addressing environmental issues in both croplands and pasture areas, whose productivity is significant, particularly to the rural economy. Programs/projects include soil protection, pasture and water resource management efforts, and strengthening of rural advisory (extension) services. However, these activities are quite recent, with most programs, some still small-scale, commencing within the past three years. Hence, it will take some time to evaluate concrete results or measure relevant indicators. Successful mainstreaming efforts in agriculture will also depend on the strength of responsible institutions and transparency in governance. For example, it has been reported that revenues collected from pastures are not invested in pasture improvement or rehabilitation projects. There are also institutional constraints, such as limited inter-ministry or inter-

[13] Data sources are Koichumanov, UNECE (2000), ADB (2004) and FAO (2006a).
[14] For reference, please see http://www.unece.org/env/pp/ctreaty.htm.

agency coordination, unclear delegation of responsibilities at all levels of government, and inadequate staff capacity for resource management in government agencies.

A grant from the Islamic Development Bank, in partnership with FAO will shortly begin to support organic farming, while a Japanese grant is financing biogas generators, with benefits both in nutrient reduction and climate change mitigation.

Agricultural research and extension services need strengthening to link the goal of increasing land productivity with knowledge and technical improvements that would also protect the land resource, e.g., methods promoting efficient use of irrigation water and proper application of fertilizers to minimize nutrient runoff. These services have been established through donor-supported projects, and they need to be scaled up. However, after project completion, they will eventually face the challenge of public budgetary constraints that could undermine their sustainability.

An appropriate enabling environment has been established to promote mainstreaming in forestry through participation in international environmental conventions, strengthening and implementation of policy and programs, strengthening of institutions through restructuring, donor-country partnerships, and provision of economic incentives for sustainable forest management. See section 1.4.B for a description of noteworthy events in the forestry sector since 1991.

Examples of achievements to date are reforestation of 16,000 ha of deforested and eroded areas, more involvement of local stakeholders in forest management and a substantial increase in lease contracts and area covered by CFM. Yet there are pressing issues that have to be addressed to fully achieve the goals of programs/projects, such as: ensuring greater participation by leaseholders (under CFM) in making decisions related to forestry management issues; further clarification of the CFM concept and regulations, lack of coordination and cooperation between ministries and agencies, the need for staff with updated skills, and inadequate inventory and facilities for monitoring activities (due to insufficient funding).

1.7. Priority Needs

The Kyrgyz Republic is on the right path towards incorporating environmental concerns into both agriculture and forestry, although the forestry strategy is more clear-cut. There are three issues that require immediate attention and action. The first priority is **institutional strengthening in both sectors**, particularly to update the resource management knowledge and skills of government staff and local stakeholders, and promote effective inter-ministerial and inter-agency coordination mechanisms among agencies at the *oblast*, *rayon*, and village levels. Agricultural research and extension services need to be strengthened and expanded. In forestry, assistance is needed to improve monitoring systems and conduct forest inventories that reflect the state of forests at the national and regional/local levels.

The second priority concerns **improving governance in both sectors**. In the agricultural sector, the roles and responsibilities of ministries and agencies should be clarified. Furthermore, transparency in the decision-making process is needed for sustainable land management and in the use of revenues from grazing fees and taxes. Local authorities depend on these revenues to provide social services for the community, but some should be invested in conservation/rehabilitation activities. Management of pasture areas should be rationalized, with local users having the primary management responsibility. In forestry, collaborative management is promoted but the decision-making process on forest management issues should be more transparent, with greater involvement of local farmers.

The third priority is **investing in specific projects**. In agriculture, there is a need to expand successful pilot projects to national programs, e.g., collaborative forest management, pasture and watershed management, rural advisory services, and IPM. Another priority is to continue to improve

irrigation and drainage systems to enhance water use efficiency and alleviate soil salinization. There is also scope for pilot projects that use a mapping system to determine the different land types in pasture areas and identify those that are risky (degraded, high slopes, landslide potential) and require rehabilitation. In forestry, there should be reforestation/afforestation projects to address the country's shortage of forests, including oportunities for carbon sequestration.

Part 2: World Bank Involvement

In the agriculture sector, there are four active projects, two completed projects, and one in the pipeline. The environment-related focus areas of these projects include: improved management of water resources (through WUAs); improved pasture management; increased water use efficiency and improved soil quality through rehabilitation of deteriorated irrigation systems; institutional and capacity building; and training of farmers in sustainable agricultural practices, including pest prevention and control. There are no World Bank projects in the forestry sector, though the Bank has contributed an important Sector Note (Brylski et al. 2001).

Sheep and Wool Improvement Project (World Bank, International Fund for Agriculture Development, and Local Governments of Kyrgyz Republic, US$ 16.8 million, 1996-2002)

This project was the first investment operation in agriculture in the country. Its objectives were to: (1) increase the profitability and efficiency of sheep and wool farming; (2) privatize the provision of several services to farmers; and (3) improve the management and conservation of natural grazing resources by farmers. The components of the project were: (1) private development of sheep-raising enterprises; (2) development of livestock support services; (3) sheep-breeding research support; (4) pasture research and monitoring; and (5) project management.

Because the country was undergoing considerable economic transition at the time of project implementation, difficulties were encountered in achieving the project's objectives (e.g., lower implementation capacity than anticipated, variable commitment by the government). Hence, the project approach was restructured to focus only on capacity building, and process and community development within the context of the project's objectives. Based on this approach, most project components were scaled down to focus more on "gaining experience" before mainstreaming.

Despite smaller than expected project outputs and incomplete disbursements, the general outcome of the project has been rated as marginally satisfactory. Many of the targets were at least partially achieved and a number of pilot investments can be mainstreamed, for example, investment in planning and community management of rangeland water points and their rehabilitation. On pasture management, the project has been instrumental in focusing on sustainable pasture use and the development of mechanisms for rangeland tenure at the community level. Furthermore, capacity was created for pasture monitoring and mapping. Also provided were detailed maps of Kyrgyz pasture areas countrywide as well as of *oblasts*, *rayons*, and farms. The surveys, maps, and training sessions played a key role in rangeland allocation pilots. Pasture leasing is now based on regular monitoring of grazing areas, and 343,000 ha of land were found unsuitable for grazing and have been withdrawn from use.

The project also helped to formulate and adopt rangeland laws based on the experience gained during project implementation, and contributed significantly in supporting a dialogue among various stakeholders in the sector. The dialogue has led to cooperation among various groups involved in pasture, animal health, and marketing, and to joint activities in rural areas.

Irrigation Rehabilitation Project (World Bank and Local Governments of Kyrgyz Republic, US$ 46.8 million, 1998-2006)

The project's development objective was to increase productivity of irrigated agriculture in the project area by improving water supply to about 250,000 ha of irrigable land. There were four project

components: (1) rehabilitating main and secondary irrigation systems; (2) building the capacity of the Department of Water Resources (DWR) of the Ministry of Agriculture and Water Resources; (3) financing a portion of incremental maintenance costs for other deteriorated irrigation systems not selected by the project; and (4) making emergency repairs to flood-damaged infrastructure.

The project allowed irrigation systems to become fully operational again, resulting in more efficient water use. Without the project, these systems would have continued to deteriorate. Second, more reliable and timely water delivery helped increase crop yields. Other impacts include: improvements in O&M, leading to less than expected maintenance works in the future; increased water efficiency and more equitable water distribution (i.e., farmers reported receiving more water at the tail-end of the system); and building the capacity of the DWR through the provision of maintenance equipment and training, which also contributed to increased water use efficiency.

Agricultural Support Services Project (World Bank, Switzerland, Germany, UK, IFAD, Kyrgyz Republic, US$ 30.2 million, 1998-2007)

The project aims to improve the incentives for Kyrgyz agriculture, as well as its productivity, profitability, and sustainability, through six components: (1) agrarian and land reform to support farm restructuring; (2) establishment of a network of rural advisory and development centers in each *oblast*; (3) seed industry development; (4) crop protection and plant quarantine; (5) market information system; and (6) institutional capacity building of the Ministry of Agriculture and Water Resources (MAWR).

Under the first project component, a small pasture management pilot program was begun. A small inter-agency working group is preparing recommendations for legislative changes in pasture management to facilitate more environmentally and socially sustainable pasture management, as well as a central role for rural self-governments and actual pasture users in managing the resource. The main activities include development of: a participatory pasture management training module; new pasture legislation; and an appropriate methodology for participatory pasture monitoring.

The second component's objective is to assist newly created private farms (through the land reform process) to undertake profitable farming on a sustainable basis. In 2006, the RAS reached 20 percent of all farms and more than 55 percent of all villages in the Republic. A Farmer Ownership Survey confirmed that RAS has been successfully established as a country-wide provider of extension services. However, the survey also emphasized the need for continued external support and further institutional development of RAS to help it achieve long-term institutional and financial sustainability.

The fourth component's objective is to help the government develop (and encourage the use of) IPM systems that guarantee user safety, public health, and environmental and agronomic sustainability. The IPM program is coordinated by the Advisory Training Center of RAS and has been developed through a number of partnerships (i.e., with regional RAS services, the Swiss-funded Agricultural and Rural Vocational Education Project, NGOs and local agro-processing companies). The program utilizes the FFS methodology, which includes interactive sessions between trainers and farmer groups. In 2006, 610 farmers participated in FFS. Through the program, trainers are educated and prepared to implement FFS after project completion, and planning seminars are carried out with representatives from the trainers, farmers, and processing enterprises. The participation of processing enterprises in the program promotes opportunities for collaboration with farmers. It should also be noted that the program addresses integrated production management, rather than just IPM.

On-Farm Irrigation Project (World Bank, Kyrgyz Republic, US$ 29 million, 2000-2008)

The project aims to increase crop production through reliable, sustainable water distribution in about 120,000 hectares of irrigated land across all *oblasts*. The World Bank-financed Irrigation Rehabilitation Project (IRP) implemented from 1998 to 2006 focused on the timely supply of adequate quantities of irrigation water to the boundaries of former state and collective farms. The On-Farm

Irrigation Project, on the other hand, further ensures that the supplied water is used more efficiently by rehabilitating and modernizing the on-farm irrigation infrastructure, particularly in areas that benefited from IRP. The components of the project are: (1) strengthening of the WUAs; (2) rehabilitation of irrigation infrastructure and O&M; and (3) implementation support.

A supervision mission in 2006 reported that quantity, delivery, and control of irrigation water have improved where rehabilitation works are complete, and farmers are pleased with the results. The works have typically addressed farmers' priorities, and the design, supervision, and construction quality have been largely satisfactory. Furthermore, 439 legally registered WUAs were formed, serving over 710,000 ha of irrigated land. The formation of active WUAs has filled the land and water management vacuum that was left when state and collective farms were disbanded. This has allowed the DWR to concentrate its limited staff and resources on off-farm system management and higher-order water resource management.

Project analysis was done on four WUAs where rehabilitation has been completed. Water extraction has decreased in all four WUAs (e.g., from 6,600 m^3/ha to 3,446 m^3/ha in one case), without negatively affecting crop yields. This implies greater water use efficiency and productivity per unit of water diverted. In one system (Suu-Omur), O&M expenditure declined by about 77 percent after rehabilitation and water use efficiency increased from 52 to 64 percent. Though the study sample is small, it is the first step towards evaluating the project's impacts.

Land and Real Estate Registration Project (World Bank and Government, US$ 11.84 million, 2000-2007)

The project's development objective is to support development of markets for land and real estate, and more effective use of land through the introduction of a reliable and well-functioning registration system for real estate. The registration system is expected to provide clarity and security of tenure that will strengthen farmer incentives for more sustainable use of land and other natural resources. The project is expected to provide more complete cadastral information that can be used for enforcing environmental regulations and land development control. The project has been rated highly satisfactory.

Water Management Improvement Project (World Bank, Japan and Government, US$ 28.1 million, 2006-2011)

Earlier World Bank-financed irrigation projects have significantly contributed to the irrigation sub-sector. However, there are still a number of deteriorated systems that need to be rehabilitated and modernized, but they are beyond the government´s financial means. The first two projects focused more on rehabilitation investments than institutional reforms. The Water Management Improvement Project is different, as it includes a major focus on institutional and financial reforms.

The project aims to: (1) improve irrigation water delivery and management to sustainably increase productivity of irrigated farmland (with a command area of about 85,000 ha in the Ferghana Valley); and (2) improve national water resource governance for the benefit of water users and the nation as a whole. Project components are: (1) rehabilitation and modernization of irrigation infrastructure; (2) management of water resources; (3) organization of beneficiaries; and (4) project management.

Second On-Farm Irrigation Project (World Bank and Government, US$ 20.6 million, in the pipeline)

This project will build on the first On-Farm Irrigation Project, with a target of 29 WUAs covering about 51,000 ha. Similar to the first project, it is expected to have positive environmental impacts, such as reduced water losses, soil salinity, and waterlogging through improved water management. The project's support for strengthening environmental monitoring and analysis in the DWR and WUA Support Units will improve the DWR's overall ability to monitor the environmental impacts of project interventions and take appropriate action where necessary.

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Annex I: Environmental Agencies

Responsibility for environmental protection in the Kyrgyz Republic is placed on the following state bodies:

Jogorku Kenesh (Parliament) of the Kyrgyz Republic. Its responsibilities include formulating state policy, setting up the legal basis for regulating protected areas, approving the state ecological program, establishing the legal regime for both emergency ecological situations and ecological disaster areas, and providing ecological safety.

Government of the Kyrgyz Republic is responsible for environmental protection through the implementation of national environmental policy; develops and implements state environmental programs; coordinates ministries, agencies, and other institutions dealing with environmental protection; develops and approves ecological standards for the release of contaminants, natural resources use, and waste disposal; identifies fees for use of natural resources, environmental pollution, and other types of harmful impacts; makes decisions on organization of protected areas and suspension of activities of enterprises, institutions, and organizations that break environmental laws; and organizes a permanent environmental education system. It is also responsible for fulfilling obligations related to global environmental agreements and conventions.

State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic (SAEPF) formulates and implements unified state policy and develops and directs environmental protection, biodiversity conservation, forest ecosystems, development of networks of protected areas, promotes efficient natural resource use, and ensures national environmental safety.

Ministry of Emergency Situations of the Kyrgyz Republic is the central body of the executive public authority, responsible for protecting the population against natural and man-made emergencies, and preventing and controlling these emergencies; it is also in charge of civil defense, technological and technical security of production, mine control, fire control, and fire fighting.

Ministry of Agriculture, Water Resources and Processing Industry of the Kyrgyz Republic oversees policy implementation in the area of agriculture and national food provision. This ministry and its regional offices are specifically responsible for environmental protection in the following areas: irrigation, livestock breeding, seed farming,ensuring of fertility, and safe handling of agro-chemicals.

Ministry of Health of the Kyrgyz Republic is in charge of drinking water quality; sanitation, and hygiene; and air and soil conditions through authorized public health bodies in cooperation with state environmental control authorities.

Ministry of Education, Culture, and Youth Policy of the Kyrgyz Republic implements national policy on environmental education in line with the concept of Continuous Environmental Education.

Local self-governing bodies implement national policy on environmental protection, and develop and implement national environmental programs at the local level.

Annex II: Socioeconomic Indicators

Indicators	Unit	1990	1995	2000	2005
School enrollment					
Primary	(% net)	--	--	86.63	90.09 (2004)
Secondary	(% net)	--	--	--	--
Tertiary	(% gross)	--	--	34.77	39.70 (2004)
Poverty rate					
National	% of population living below $2.15/day	--	--	78	74 (2001) 73 (2002) 70 (2003)
Capital		--	--	11	10 (2001) 10 (2002) 9 (2003)
Urban		--	--	30	31 (2001) 29 (2002) 28 (2003)
Rural		--	--	70	69 (2001) 71 (2002) 72 (2003)
Access to safe water (ECA Region)	% of total population with access	78.00 (92.59)	-- --	-- --	77.00 (2004) (91.91) (2004)
Real GDP, at 2000 US$	billion US$	2.06	1.04	1.37	1.64
Per capita	US$ per person	464.91	227.15	278.66	318.53
Real value added					
Agriculture	% of real GDP	21.00	30.44	34.23	32.44
Industry	% of real GDP	51.78	29.62	28.83	23.64
Manufacturing	% of real GDP	24.83	13.45	18.10	14.92
Services, etc.	% of real GDP	30.71	34.75	29.97	35.20

Sources: World Bank (2005b, 2006a).
Notes: All data are from 2005, unless mentioned otherwise; "--" means no data available.