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KYRGYZ REPUBLIC

STATE COMMITTEE FOR WATER RESOURCES AND LAND IMPROVEMENT

AGRICULTURE PRODUCTIVITY AND NUTRITION IMPROVEMENT PROJECT

ENVIRONMENTAL MANAGEMENT PLAN

February 2015

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ACRONYMS

AF	**Additional Financing for OIP-2**
AISP	**Agricultural Investments and Services Project**
APNIP	**Agriculture Productivity and Nutrition Improvement Project**
CSU	**Central Support Unit (for WUA development)**
DWR	**Department of Water Resources**
EA	**Environmental Assessment**
EMP	**Environmental Management Plan**
GAFSP	**Global Agriculture and Food Security Program**
GDP	**Gross Domestic Product**
GOKR	**Government of the Kyrgyz Republic**
I&D	**Irrigation and Drainage**
IDA	**International Development Association**
IPM	**Integrated Pest Management**
IRP	**Irrigation Rehabilitation Project**
ISDS	**Integrated Safeguards Data Sheet**
MOALI	**Ministry of Agriculture and Land Improvement**
MOM	**Management, Operation and Maintenance**
NEAP	**National Environmental Action Plan**
NGO	**Non-governmental organization**
OIP	**On-farm Irrigation Project**
OIP-2	**Second On-farm Irrigation Project**
ORT	**Oblast Rehabilitation Team**
OSU	**Oblast Support Unit (for WUA development)**
PIU	**Project Implementation Unit**
RAS	**Rural Advisory Services**
RSU	**Raion Support Unit (for WUA development)**
SAEPF	**State Agency for Environment Protection and Forestry**
SCWRLI	**State Committee for Water Resources and Land Improvement**
SDC	**Swiss Agency for Development and Cooperation**
SEE	**State Ecological Expertise**
TEIU	**Technical Expertise and Investment Unit (DWR)**
WMIP	**Water Management Improvement Project**
WUA	**Water Users Association**

1. INTRODUCTION

This Environmental Management Plan (EMP) has been prepared for the Kyrgyz Republic's proposed **Agriculture Productivity and Nutrition Improvement Project (APNIP**), which will be supported by the International Development Association (IDA) and financed through a trust fund provided by the Global Agriculture and Food Security Program (GAFSP). The EMP is intended to ensure that the proposed project incorporates sound environmental management principles and practices and thus complies with the environmental policies and laws of the Government of the Kyrgyz Republic (GOKR), as well as with IDA environmental safeguard policies.

1.1 Background

In the Kyrgyz Republic, agriculture remains one of the main sectors of the country's economy, contributing about a quarter of GDP and providing employment for some two-thirds of the population in rural areas. There are about 1.3 million ha of irrigated area and 9 million ha of pasture for livestock production in the country, which together provide around 90 percent of all agricultural products. Irrigation is very important for profitable agricultural production, and having reliable and effective irrigation infrastructure that is well managed is necessary to maintain and increase agriculture productivity.

During the first years after independence, the irrigation sub-sector was adversely affected by the difficult transition and the lack of capacity by government and by farmers to cover operation and maintenance costs of irrigation schemes. This resulted in a rapid deterioration of hydraulic structures, including dams, headworks, and canals. By 1996, the deterioration of higher-order irrigation systems and the subsequent loss of design capacity of many systems were having an increasingly negative impact on irrigation water supply. On-farm infrastructure was served by state and collective farms, but became "ownerless" following the break-up of the USSR. Local government and newly established organizations of water users had insufficient institutional, technical, and financial resources to properly operate and maintain on-farm irrigation infrastructure and provide for capital repairs. As a result, many of these systems also fell into disrepair and water users had great difficulties in timely and adequate water delivery and management. These problems eventually led to reductions in agricultural production and exclusion of irrigated lands from crop rotation.

The GOKR has identified a well-functioning irrigation sub-sector as one of the main priorities for sustainable agricultural development. Irrigation is a key input for agricultural production as the semi-arid to arid climate of the country is such that hardly anything grows without irrigation.

During the past ten years, the World Bank has supported the GOKR with a number of projects in the irrigation and drainage sub-sector. The **Irrigation Rehabilitation Project** (**IRP**), completed in 2006, assisted in the rehabilitation and modernization of twenty-five irrigation schemes, commanding over 280,000 ha and four large dams that provide water to 415,000 ha. Subsequently, the **On-farm Irrigation Project** (**OIP or OIP-1**), completed in 2008, supported the development of Water Users Associations (WUA) commanding an irrigation area of about 700,000 ha, including 120,000 ha that benefited from rehabilitation and modernization of irrigation and drainage infrastructure. Based on the success of **OIP-1**, the GOKR then undertook a **Second On-farm Irrigation Project (OPI-2)**, which continued further development of the WUAs and rehabilitation and modernization of on-farm irrigation and drainage (I&D) systems on around 70,000 ha. This project too has delivered good results to date, with yields in rehabilitated WUAs being around 20% higher than those of non-rehabilitated WUAs.

In an effort to continue the momentum and apparent successes of **OIP-1 and OIP-2**, the GOKR submitted a proposal for a similar on-farm irrigation development project to the GAFSP in March 2012. The GAFSP approved the proposal in May 2012. It is expected that under the proposed APNIP around 55,000 ha of on-farm I&D systems will be rehabilitated and managed in an efficient manner by 40 WUAs representing around 40,000 smallholder farms and farming families, comprising about 180,000 people, with more than half irrigating less than one ha of land, and including 20 percent female-headed households. Agricultural advisory services for improved crop production and nutrition interventions will benefit around 325,000 people (72,000 households) in the Ayil Okmotus in which the selected WUAs are located. Vulnerable families and particularly women and children will benefit specifically from nutrition interventions.The scope of the proposed project addresses major issues that were identified during an extensive dual-level, two-phased consultation process involving over 500 people representing GOKR, non-governmental agencies, potential beneficiaries and international agencies working in the Kyrgyz Republic.

The GAFSP proposal includes the GOKR's explicit recognition of the importance of environmental sustainability and climate change adaptation to the country's sustainable economic development, improved water resources management and increased agricultural production:

- **Environmental Sustainability**. The mountainous nature of the Kyrgyz Republic directly results in increased environmental vulnerability. Both lack of funding and poor conservation and sustainable use of natural resources inhibit economic development and poverty reduction. Improvements in legislation, development of a national policy on climate change, international cooperation on environmental problems to meet obligations under various global environmental conventions, programs to enhance biodiversity conservation and sustainable use of natural resources, and increased awareness and involvement of civil society in development and implementation of policies and legislation will be implemented under MTDP.
- **Climate Change**. The Kyrgyz Republic has been adversely affected by climate change with increasing floods, severe winters, and natural disasters. Such events continue to increase the incidence of poverty and food insecurity, temporarily and in some cases permanently. Farming systems and natural resources management have to be adapted to climate change. This has to be largely addressed through rehabilitation of irrigation and drainage systems, better farming practices and inputs, and better land, pastures and water management to increase productivity, climate change adaptation, and sustainable use of natural resources.

1.2 Objective

The objective of the environmental assessment (EA) in Sections 1-5 of this document is to identify the significant environmental impacts of the proposed project (both positive and negative) and to specify appropriate preventive actions and mitigation measures to prevent, minimize or eliminate any anticipated adverse impacts. The environmental management plan (EMP) contained in Section 6 of the document is the management tool that ensures that the environmental prevention and mitigation measures identified in the EA, as well as the monitoring and institutional strengthening activities recommended, will be properly undertaken during implementation of the proposed project. The EMP also establishes the necessary institutional responsibilities, proposes a timetable for implementing these activities, and estimates their costs for the proposed project budget.

1.3 IDA Safeguard Policies

As with the Integrated Safeguards Data Sheets (ISDSs) prepared for **OIP-1** and **OIP-2**, the ISDS for **APNIP** classified it as a Category "B" project, triggering the IDA safeguard policies for environmental assessment, safety of dams and projects on international waterways. The desk review EA performed for **APNIP**, based on a decade of environmental management experience with **OIP-1** and **OIP-2**, followed by an environmental screening mission undertaken in February 2013, confirmed the Category "B" designation for the proposed project, finding no likelihood of significant, irreversible, cumulative or long-term adverse impacts resulting from the proposed project. In fact, consistent with the previous projects, the EA identified a number of likely positive impacts of the proposed project and only minor negative impacts that could be effectively prevented or reduced through application of appropriate preventive actions or mitigation measures (see discussion of impacts in Section 5). The EA again also confirmed the application of the other two safeguard policies specified above and examined but rejected application of the Bank's safeguard policies for pest management, involuntary resettlement, cultural property, forestry, natural habitat, indigenous peoples and projects in disputed areas. A discussion of the EA's findings with respect to these policies follows.

1.3.1 Environmental Assessment (OP 4.01). The anticipated environmental impacts involved in rehabilitation of the irrigation and drainage infrastructure in **APNIP** trigger this safeguard policy. Because the anticipated adverse impacts are not expected to be significant or irreversible, however, and because they can be prevented or reduced through appropriate preventive actions or mitigation measures, the project is classified a Category "B" project, which requires only partial environmental assessment under this policy. This EMP, with its partial EA, ensures that recommended preventive actions and mitigation measures will be taken and thus satisfies this safeguard policy.

1.3.2 Safety of Dams (OP 4.37). As was done with the projects before it, **APNIP** will follow a programmatic approach, with the WUA-managed irrigation systems eligible for rehabilitation under the project to be selected during the first years of project implementation. Therefore, it is not yet known whether there will be any systems with water storage reservoirs implicated in the project. However, experience under both **OIP-1** and **OIP-2** indicates that it is likely that several systems will be selected that have small dams (less than 15 m in height). For this reason **APNIP** triggers this dam safety policy. Once this has been determined for **APNIP**, appropriate actions to ensure dam safety, including more detailed inspections and safety measures, will be taken. In the case of any small-scale irrigation dams and night storage reservoirs that may be part of a selected irrigation system, the special guidelines for these systems prepared for **OIP-2** will apply and are included in the present EMP.

As with **OIP-2**, before any rehabilitation activities can take place under **APNIP** at an irrigation system to which these guidelines apply, the Project Implementation Unit (PIU) will contract a qualified national design firm to make an engineering and safety assessment of the irrigation dam or storage reservoir in question, and prepare designs for the recommended measures. The PIU will contract a *qualified engineering contractor*, one that has experience with small earthen dams and/or small storage reservoir systems, to perform the remedial measures recommended in the engineering and safety assessment. The PIU, through the engineering team, will oversee the implementation of any remedial measures performed at irrigation dams or storage reservoirs under the project.

1.3.3 Projects on International Waterways (OP 7.50). Many of the irrigation systems that will be rehabilitated under **APNIP** draw water from rivers that are international waterways (i.e. Naryn, Talas and Chui Rivers) shared by the Kyrgyz Republic with neighboring Kazakhstan, Tajikistan and Uzbekistan. For this reason **APNIP** triggers the policy on international waterways. Potential changes in water flow or deterioration in water quality during the construction works should be mitigated through implementation of measures contained in the EMP. As there will not be any

enlargement of existing irrigation systems or development of any new irrigation areas under **APNIP**, project interventions are not expected to adversely affect the quantity or quality of water flows to downstream riparian states. On the contrary, the rehabilitation and modernization of infrastructure and improvements in water management should result in an increase in system efficiency, thereby generating water savings and providing reliable water supply to system users while safeguarding water flows to downstream riparian states. For these reasons the project falls under the exception to the riparian notification requirement contained in this safeguard policy.

1.3.4 Pest Management (OP 4.09). Consistent with the prior projects, the EA determined that **APNIP** does not trigger the pest management safeguard policy. The project will not procure any pesticides nor will the project alone induce an increase in the use of pesticides. The EA determined that current pesticide use in the Kyrgyz Republic remains relatively low as a result of adverse economic conditions; farmers simply cannot afford to purchase chemical inputs. The EA also recognizes that the long-term recovery of the agricultural sector is likely to result in an increase in pesticide use in the future. However, a return to the high use levels of the Soviet period is not foreseen. Furthermore, any change in farmers' ability to invest in inputs is expected to be gradual and occur long after the completion of the project, since the recovery of the agricultural sector is dependent not only on increased agricultural production but also on improved rural economic conditions, expanded access to markets, and higher agricultural prices. Anticipating these long-term impacts, however, the EA again recommends training and agricultural extension for farmers on proper pest management practices, including integrated pest management (IPM). Capacity building for farmers should improve overall pest management, reduce future demand for pesticides and thus minimize the environmental impacts of any pesticide use. Such capacity building was provided to farmers under **OIP-2** and will be continued under the **APNIP**.

1.3.5 Involuntary Resettlement (OP 4.12). The EA also determined that **APNIP** does not trigger the involuntary resettlement policy. **APNIP** will not involve any physical relocation of local populations or acquisition of land, nor will it result in any significant loss of assets (e.g. farmlands) or access to assets, or loss of income sources (e.g. crops) or means of livelihood. On the contrary, **APNIP**, following its predecessor projects, is specifically designed to improve the value of farm assets and thus increase farm incomes. Furthermore, the proposed project will not impose any restrictions on access to local farmlands; any interference with access to farmlands resulting from the rehabilitation works on irrigation canals or drainage collectors will be temporary, short-term and insignificant in nature.

1.3.6 Cultural Property (OPN 11.03). Based on the experience with **OIP-1** and **OIP-2**, the EA concluded that **APNIP** will not involve any "cultural property" as defined by this safeguard policy. The proposed project, by definition, will be implemented on existing irrigation and drainage systems on well-established agricultural lands, lands that were converted to agriculture some 50 years or more ago during Soviet times. Furthermore, the proposed project will not involve any extension of these lands into non-agricultural areas. While these farmlands and the associated man-made assets are perhaps of national and local importance in terms of their agricultural productivity and economic output, they are without any particular archeological, historical, religious or cultural significance for the Kyrgyz Republic.

1.3.7 Remaining Safeguard Policies. Again, in line with the prior projects and consistent with the initial ISDS determination, the EA found that **APNIP** does not trigger the remaining safeguard policies for the following reasons:

- **Forests (OP 4.36).** The project will involve no forested or woodland areas, which would trigger this policy.
- **Natural Habitats (OP 4.04).** The project will involve no conversion of natural areas or critical natural habitats, which would trigger this policy.

- **Indigenous Peoples (OD 4.2).** The project will involve no indigenous peoples, ethnic minorities or tribal groups, which would trigger this policy.
- **Projects in Disputed Areas (OP 7.60).** The project will not be implemented in a disputed area, which would trigger this policy.

2. DESCRIPTION OF THE CURRENT SITUATION

Description of Physical Environment

The Kyrgyz Republic lies between 39.40 and 42.15 N and 69.15 and 80.20 E. It has a total area of 199,900 km^2, 90 percent of which lies above 1,500 MASL, and more than 70 percent of the country is mountainous. Main features are the Tien Shan Mountains in the west and the Pamir-Alay in the south-west. Total population is approximately 5 million people, 55 percent of whom live in rural areas. The climate is continental, with cold, snowy winters and hot, dry summers. Mean rainfall and temperatures vary according to altitude. In the valleys, winter temperatures regularly reach –5 or –10 ˚C, while summer temperatures rise to the mid 30s. Average rainfall is estimated at 533 mm, ranging from 230 mm on the northern side of Lake Issyk-Kul to 700 mm in some areas of the Fergana valley. Approximately half of the total precipitation falls outside the growing season from April to September, and snowfall constitutes an important part of it. The frost-free period ranges from 120 days in Naryn to 240 days in the Fergana Valley. Agricultural areas are located in the valleys with lower elevations and are separated from each other by the mountain ranges. The most important agricultural areas are the Lake Issyk Kul basin and the upper Naryn, Chui, Talas and Fergana valleys.

The mountain areas of the country are rich in water resources and they are the source of many rivers that flow into Kazakhstan, Uzbekistan, Tajikistan, Turkmenistan, and the Xijian Province of China. Even though the country has abundant surface and groundwater resources and has reserves held in over 2000 lakes, permanent snowfields and glaciers, it is using almost its entire allocated share of water resources.

There are five main river basins in the country covering roughly 97 percent of the average annual runoff and 75 percent of the country's surface (see Table 1). There are considerable intra-seasonal and inter-annual variations in the average runoff in the basins. Thus, the use of water resources for hydropower generation, irrigation, industrial and municipal uses has required the construction of dams. There are 18 dams in the country, 13 of them used mainly for irrigation purposes. Dams and reservoirs provide a total live storage capacity of 1,656 million m^3. The use of groundwater is limited to domestic and industrial applications.

Table 1: Main River Basins of the Kyrgyz Republic

River Basin	Basin Area, Km^2 (Oblasts)	Average Annual Runoff, Million m^3 (% of K .R. Total)
Syr Darya (Naryn)	99,458 (Jalalabat, Naryn, Osh)	27,250 (58%)
Amu-Darya	7,700 (Osh)	1,930 (4%)
Chui	14,154 (Chui, Naryn)	5,090 (11%)
Talas	7,640 (Talas)	1,740 (4%)
Issyk Kul	15,738 (Issyk Kul)	4,680 (10%)

Source: WMIP EMP

Agricultural land, including rangelands, are estimated at 10,613,900 ha, roughly 53 percent of the country's surface. Out of all the agricultural lands, 1,308,900 ha are arable, most of which have been developed for irrigation.

3. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Policy Context

The national environmental policy of the Kyrgyz Republic is articulated in a number of national strategies and action plans adopted in the 1990s. The best statement of national environmental policy objectives is the **National Environmental Action Plan** (NEAP), which was adopted in 1995. Taking a long-term perspective, the NEAP recognizes that the country's primary objectives are to ensure sustainable economic growth and reduce poverty but emphasizes that environmental protection is both a tool and a condition for achieving these long-term economic goals. To this end, the NEAP contains objectives for improving management of renewable and non-renewable natural resources and protecting public health. Among the actions planned to achieve these objectives are investments into water and sanitation infrastructure and support for rural natural resource-based activities in order to achieve economic development while conserving the natural resource base. Other policy documents containing national environmental policy objectives are the **Strategy for Sustainable Human Development**, approved by Presidential Decree in 1996, and the **Ecological Safety Concept** prepared subsequently by the then Ministry of Environmental Protection. Taken together, these documents identify the following environmental objectives of relevance to **APNIP**:

- Using water resources efficiently and economically;
- Protecting arable lands from degradation; and
- Improving the environmental monitoring system.

3.2 Legal/Regulatory Framework for Environmental Assessment/Management

The **Constitution** of the Kyrgyz Republic, adopted in 1993, contains provisions addressing environmental protection and management of the country's natural resources. Article 4, for example, provides that the lands, air, waters, plant life, wildlife, and other natural resources are the basis of life for the Kyrgyz people and are granted special protection by the State. The **Constitution** further recognizes the right of every Kyrgyz citizen to a favorable and healthy environment and to compensation for damage to health and property caused by misuse of natural resources. This right is accompanied by the duty of each citizen to use the environment and natural resources of the country with care in order to protect these resources for the generations to come.

Pursuant to these constitutional provisions, the Kyrgyz Republic has adopted a solid legal framework for environmental management. The principal environmental laws and codes of relevance to **APNIP** are the **Water Code**, adopted in 2005, the **Law on Environmental Protection**, enacted in 1999, and the **Law on Ecological Expertise**, also adopted in 1999. A brief description of these principal environmental measures and their relevance to **APNIP** follows.

Water Code The promulgation of the **Water Code** in 2005 marked a significant change in the country's policy and institutional framework with respect to management of water resources. The new **Water Code** establishes the basin approach as the overriding principle of water resources management (WRM) in the country for the first time. It establishes the national institutional framework for WRM, determining the duties and responsibilities of state bodies, reforming some of the existing state bodies and creating some new state institutions. Among the duties and responsibilities it specifies are:

- monitoring of water resources (both quantity and quality);
- protection of water resources from pollution and depletion;

- economic mechanisms for water use;
- regulation of abstraction and use of surface and groundwater, oversight of water exploitation;
- regulation of economic activities that involve water resources, such as irrigation;
- regulation of water supply contracts;
- management of emergency situations and dam safety issues; and
- international cooperation on water resources.

The **Water Code** creates a State Water Inspectorate for detecting violations and enforcing water legislation and a Single Water Information System for disseminating public information on water resources management issues.

The **Law on Environmental Protection** is the fundamental law governing environmental protection and management of natural resources. This law establishes the country's basic principles of environmental protection and provides the legal authority for setting standards of environmental quality, designating specially protected areas, promulgating rules and procedures for use of natural resources, establishing a system of environmental monitoring and control and setting procedures for handling emergency situations. Among the norms and standards of environmental quality authorized under the law are the following of relevance to **APNIP**:

- Norms of maximum safe concentrations of hazardous substances in air, water, soil and subsoil;
- Norms of maximum safe use of chemicals in agriculture;
- Standards on natural resource use; and
- Norms of maximum safe levels of noise, vibration and other hazardous physical impacts.

Finally, the law establishes requirements for the environmental examination (environmental assessment) of planned economic and other activities in order to prevent possible harmful environmental impacts. Furthermore, it prohibits financing and implementing projects associated with use of natural resources without positive conclusions of the State environmental examination.

The **Law on Ecological Expertise** is the basic legislation dealing with environmental assessment. Its goals are to prevent negative impacts on human health and the environment from economic and other activities and to assure compliance of such activities with the country's ecological requirements. The law applies broadly to "development projects" that may have an impact on the environment, including:

> Feasibility studies and also construction, reconstruction, development, re-equipment projects, regardless of their estimated costs, affiliation and patterns of ownership, implementation of which can have an impact on the environment (Clause 3).

Under the law the initiator of a project is responsible for submitting the necessary documentation on the project and its ecological impacts for State Ecological Expertise (SEE). Review of the documentation submitted for SEE is performed by an expert commission established by the State Agency for Environment Protection and Forestry (SAEPF) for that purpose. A positive statement of state ecological expertise is required before the project can be financed or implemented. A negative statement prohibits the project from being implemented. The details of the requirements for the SEE process are set out in the **Instructions for Ecological Expertise** promulgated in 1997 (see pertinent excerpt in Annex A).

The Kyrgyz Republic has a number of other environmental laws, regulations and resolutions addressing specific environmental issues. Those relevant to the project are summarized in Table 2:

Table 2: Principal Environmental Laws, Regulations and Resolutions

Legal Authority	Legal Mandate
Constitution (1993)	Provisions addressing environmental protection and management of the country's natural resources, rights and duties of citizens
Water Code of the Kyrgyz Republic (2005)	Establishes national policy, legal and institutional framework for management and conservation of water resources
Law on Environmental Protection (1999)	Defines national environmental policy and establishes the legal and institutional framework for environmental protection and natural resources management
Law on Ecological Expertise (1999)	Requires environmental review (ecological expertise) and the prevention of negative environmental and human health impacts from economic and other activities
Law on Specially Protected Natural Territories (1994)	Defines different types of specially protected natural territories, where different types and/or levels of economic activities
Law on Atmospheric Protection (1999)	Regulates atmospheric emissions and specifies responsibilities regarding atmospheric protection

The GOKR has also ratified a number of international environmental conventions and agreements of relevance to the project:

- Convention on Protection and Use of Transboundary Waters Flows and International Lakes (1992);
- Convention on Environmental Impact Evaluation in Transboundary Areas (2001);
- Agreement on Cooperation in the Sphere of Environmental Protection and Rational Use of Natural Resources (Kyrgyz Republic, Kazakhstan, Uzbekistan) (1998);
- Convention on Wetlands of International Significance (1971);
- Convention on the Right to Use International Water Flows as Transportation Routes (1997), Agreement On Use of Water Resources Structures of Interstate Use on Chui and Talas Rivers (Kyrgyz Republic and Kazakhstan) (2000); and
- Convention on Transboundary Impacts of Industrial Accidents (1992).

3.3 International Framework for Water Resources Management

During Soviet times the water resources in Central Asia were allocated centrally to the five Central Asian Republics. The Kyrgyz Republic was allocated an annual share of 11.57 billion m^3, approximately 24 percent of the flows leaving the Republic. Details of the allocations are presented in Table 3. After independence from the Soviet Union, the five republics of the Aral Sea basin signed an agreement in February 1992 for the cooperation, management, utilization and protection of water resources, which ratified the previous allocations.

Table 3: Average Annual Discharge Volumes Allocated to the Kyrgyz Republic

River System	Average Annual Discharge (Billion m^3)	Allocation to Kyrgyz Republic		
		% Flow	Volume (Billion m^3)	Groundwater
Amu-Darya	1.93	22	0.42	0.04
Syr Darya	27.25	18	4.88	0.85
Talas	1.74	55	0.95	0.02
Chui	5.09	76	3.85	0.4
Issyk Kul	4.68	32	1.5	0.1
Ili	0.36	N/A	N/A	N/A
Tarim	6.18	N/A	N/A	N/A
Total	**47.23**	**24.5**	**11.6**	**1.41**

Source: WMIP EMP

3.4 Institutional Framework for Environmental Assessment/Management

A number of state institutions share environmental management responsibilities in the Kyrgyz Republic. The primary state institution, now called the **State Agency for Environment Protection and Forestry** (SAEPF), has the general mandate to implement the **Laws on Environmental Protection and Ecological Expertise** mentioned above. Its responsibilities include setting national environmental policy, promulgating environmental quality norms and standards, designating specially protected areas, establishing an environmental monitoring network, and conducting ecological expertise reviews of development projects and economic activities.

Responsibility for management of water resources lies with the **State Committee for Water Resources and Land Improvement** (SCWRLI), whose Department of Water Resources (DWR) has primary responsibility for managing the country's water resources. Table 4 provides an overview of the primary institutions with responsibilities relevant to **APNIP**.

Table 4: Primary State Environmental Institutions

Institution	Relevant Responsibilities
State Agency for Environment Protection and Forestry (SAEPF)	Management of environmental protection activities; Monitoring of the state of the environment in general and the water bodies in particular; Reviewing Ecological Expertise of diverse projects; Monitoring wastes from economic activities.
State Committee for Water Resources and Land Improvement. Department of Water Resources (DWR)	Development of necessary off–farm infrastructure for use of water for irrigation purposes; Operating and maintaining the off-farm irrigation infrastructure; Assisting the water users in organizing into WUAs; Training WUAs in operating and maintaining the infrastructure they manage.
Kyrgyz Comprehensive Hydro-Geological Expedition - State Agency for Geology and Mineral Resources	Collecting data on quantity and quality of groundwater.
Ministry of Health (MOH): Department of Public Sanitary - Epidemiological Surveillance (SES)	Bacteriological and chemical monitoring of hydrological facilities.
Kyrgyz Hydro-meteorological Agency	Monitoring the state of the atmosphere, air and surface waters.

As noted above, the SAEPF has responsibility for performing the SEE review of projects like **APNIP**. The Department of National Ecological Expertise administers this process and is in charge of assessing all civil works, including rehabilitations. This department reviews the project documentation submitted for approval, assessing environmental impacts and evaluating the proposed mitigation measures. It also has the responsibility for monitoring the environmental impacts during construction and operation of projects.

4. DESCRIPTION OF PROJECT AND ALTERNATIVES CONSIDERED

4.1 Description of Project

4.1.1 Project Objective. The proposed project development objective is to increase agricultural productivity and food security of rural households in selected areas nationwide. This is to be achieved through an improvement in irrigation service delivery through rehabilitation of irrigation and drainage (I&D) infrastructure at on-farm level; improved water management by Water Users Associations (WUAs) and farmers; provision of agricultural advisory services and training; and upscaling of key nutrition interventions.

4.1.2 Project Scope. APNIP will continue with and build on the work done by **OIP-1** and **OIP-2**. The proposed project, which will be implemented nationwide, will have four major components: (i) rehabilitation and modernization of physical irrigation and drainage (I&D) infrastructure, (ii) agricultural advisory services; (iii) nutrition interventions; and (iv) project management. An additional component on institutional development and capacity building will be financed through a separate trust fund financed by the Swiss Agency for Development and Cooperation (SDC). **APNIP** will target rehabilitation of selected on-farm I&D systems covering around 30,000 ha, managed by 18 WUAs representing around 40,000 smallholder farms and farming families, comprising about 170,000 people. More than half of these smallholders are irrigating less than one ha of land and these include 20 percent female-headed households. About 50 percent of these smallholder farmers and farming families, including women, will benefit from advisory services and training, including cultivators of households plots who are mostly women. Families and particularly women and children will benefit specifically from project nutrition interventions.

4.1.3 Project Components

APNIP will have the following four components:

Component 1: Rehabilitation and Modernization of Irrigation and Drainage Infrastructure (estimated costs US$ 26.4 million). This component finances the rehabilitation and modernization of the existing command area of I&D systems on 55,000 ha managed by 40 WUAs and WUA Federations, limited rehabilitation works on critical off-farm structures managed by the DWRLI, and the provision of essential maintenance equipment to WUAs and Federations of WUAs (FWUAs). The concept is to strengthen WUAs into mature and sustainable entities that are able to manage, operate and maintain their systems. From all 481 WUAs nationwide, only WUAs who meet the agreed criteria and procedures will be eligible for rehabilitation and equipment. Works to be carried out include the rehabilitation and construction of on-farm I&D canals, outlets, water measurement and other hydraulic structures, and some limited rehabilitation works on critical off-farm infrastructure, in order to enable the DWRLI to more adequately manage water delivery to WUAs. In line with the arrangements under the OIP-1, the OIP-2 and its AF, WUAs will repay part of the costs for rehabilitation and equipment to a WUA Support Fund (SF), which will be dedicated to provide financial assistance to other WUAs. The capacity building for WUAs will be financed under the NWRMP.

Component 2: Agricultural Advisory Services (estimated costs US$ 5.0 million). This component will improve the provision of advisory services to WUA members to increase productivity on irrigated land and improve access to markets. The potential benefits of irrigation improvement can best be achieved in combination with improved on-farm water delivery, soil management, improved access to markets and agronomic practices, particularly where irrigation improvement will allow increased crop diversification. This component will help WUAs to contract the preparation and implementation of agricultural development plans. The development plans will be based on participatory rapid assessment including identification of available natural

resources and identification of market opportunities. The development plans will aim to improve productivity through the provision of technical advice and demonstrations on topics such as on-farm planning and management, crop production, farm diversification, livestock husbandry, on farm water management, efficient irrigation technologies, soil fertility and protection, and integrated pest management (IPM). Also, the development plans will aim to improve commercial relationships between farmers and financial institutions, input suppliers, service providers and buyers to exploit identified market opportunities, through advice on collective procurement and marketing, facilitation of contracts and provision of management and financial planning advice. The project will provide training to WUAs on how to manage advisory and extension services, building on the experience of the Agricultural Investments and Services Project. The activities will take place at WUAs selected for rehabilitation and the adjacent WUAs located in the same Ayil Okmotu, with around 100 WUAs in around 40 Ayil Okmotus participating. The project will provide small grants of US$55,000 per group of WUAs in one Ayil Okmotu. Grants will be used for: (i) preparation of agricultural development plans, advice and facilitation of development plan implementation, limited to a fixed amount of 10 percent of the grant amount; and (ii) procurement of inputs, materials, equipment and minor improvement in farm infrastructure that may be required to implement the training and demonstration aspects of the agricultural development plan over a two year period. At the end of the grant period, the Project will assist WUAs to establish contracts with advisory services using their own funds. Steps will include: (i) training of WUA in management of advisory service contracts; (ii) helping the WUAs to prepare Terms of Reference (TORs) for advisory services; (iii) participatory rapid assessment; (iv) preparation of agricultural development plans; and (iv) facilitation of development plans. In addition, some funds will be allocated to continuing demonstrations for on-farm water management which were started under the OIP-2.

Component 3: Nutrition Interventions (estimated costs US$ 5.2 million) The purpose of this component is to contribute to improvement of the food security and nutrition levels of beneficiaries in the Ayil Okmotu where the WUA is located, especially women, female adolescents and children. The component has two sub-components implemented in parallel to ensure complimentary and adequate sequencing of interventions: (i) a community level nutrition awareness building program; and (ii) dietary diversification through improved domestic gardening on household plots. In the target areas, these interventions will complement current efforts at the national level of the Government and development partners to address under-nutrition in the country.

Sub-component 3.1. Improved household nutrition through nutrition education. This sub-component will improve household nutrition through a targeted nutrition building campaign (based on similar campaigns currently on-going) consisting of the following elements: (i) nutrition education campaign aimed at mothers, adolescent girls and pregnant women on breastfeeding and adequate complementary feeding; (ii) food preparation and preservation with the aim to increase the nutritional value of food consumed and ensure food safety in the households; and (iii) supplemental feeding for pregnant women to improve vitamin and micronutrient uptake. The nutrition campaign is based on existing campaigns and interventions delivered through VHCs. Their efforts will be coordinated at central and local level with support of UNICEF as a lead agency for nutrition in the country.

Sub-component 3.2. Improved household nutrition through domestic gardening. This sub-component will improve household nutrition and dietary consumption through a comprehensive approach to ensuring the availability of nutritious agricultural products at the household level year-round (based on similar interventions currently on-going). The project will: (i) establish small household garden demonstration plots; (ii) provide training and agronomic advice (iii) basic

equipment and inputs for improved household garden production and diversification; and (iv) skills in food preparation and preservation to increase the nutritional value of food consumed year-round. Household plots are most commonly cultivated by women. Training, advice and inputs will be targeted in the first year on the most vulnerable households in the Ayil Okmotu, especially female-headed households, identified by vulnerability criteria agreed through a consultative process. Selection of participants in the targeted areas will be through a competitive community-based process with participation from local representatives of the Ministry of Social Development, Ayil Okmotus, and village health centers (VHCs) to ensure efficiency and transparency. A Participatory Rapid Assessment (PRA) will identify the problems, needs and interests of the households. Guidelines and methodologies refined in the first year of implementation will be expanded in subsequent project years to target all poor and food insecure households in the project areas. Advice will include guidelines on nutritional crops suitable for different soil types, prolonging the growing season through simple greenhouses, fertilizer and compost use, seed quality, pest management, storage, and the rearing of small livestock. Equipment and inputs will be provided to poor households to enable implementation of improved production practices.

Component 4 – Project Management (estimated costs US$ 1.4 million). This component finances staff, training, equipment and operational costs for the daily management, administration, coordination, procurement, financial management and monitoring and evaluation of the project, in line with the World Bank procedures. Until December 30, 2015, PIU core staff for management, procurement, financial management and engineering is financed under the OIP-2. Therefore, under this component, the incremental costs for project management of Component 2 and 3 and additional monitoring and evaluation (M&E), financial management and procurement capacity will be financed for the full project period and for general project management and Component 1 from January 1, 2016 onwards.

4.2 Analysis of Project Alternatives

No Action Alternative. Given that the **APNIP** is limited, by design, to rehabilitation of existing I&D infrastructure at selected locations throughout the country, the usual analysis of alternatives in terms of location, design or technology has limited applicability in this case. The decade of successes with the proven approach taken by both **OIP-1** and **OIP-2** also argues against selecting alternatives for **APNIP**. The 'no action' alternative is not desirable from an economic, ecological or social point of view. This alternative would allow the existing systems to continue to deteriorate, decreasing water availability at the water user level, reducing the productivity of the agricultural lands, increasing the loss and irrational use of water resources, increasing the likelihood of waterlogging and soil salinization in some locations and, finally, increasing migration from rural areas. Given the importance of agriculture to the welfare of the local population and the critical role irrigation plays for the country as a whole, the 'no action' alternative would not be an acceptable option.

5. ENVIRONMENTAL IMPACTS AND PROPOSED PREVENTIVE ACTIONS AND MITIGATION MEASURES

Like **OIP-1** and **OIP-2** before it, **APNIP** is designed to provide economic, social, and environmental benefits, through the development of WUAs and rehabilitation and modernization of irrigation and drainage infrastructure, to the farmers, farm families, and rural communities in the project areas. Experience with the previous projects suggests that the overall environmental impact of the proposed project is likely to be positive. In fact, the EA identifies many positive impacts of the proposed project (consistent with previous project experience), including reduced irrigation system water losses, enhanced management of water resources, increased agricultural productivity, and improved soil fertility. The EA also identifies some potential negative impacts on environmental conditions in the project area that will require attention, preventive action and appropriate mitigation measures in the planning, design, construction, operation and maintenance phases of the project. Fortunately, the potential negative impacts are relatively minor and are far outweighed by the positive economic, social and environmental benefits the EA considered. A discussion of these impacts follows.

APNIP will finance the rehabilitation of on-farm irrigation and drainage infrastructure under the control of selected WUAs (those meeting established performance criteria) in order to improve water use efficiency, increase delivery within existing irrigation systems and arrest the process of land degradation from waterlogging and salinization of soils. All these works will be relatively minor in nature. Stakeholder involvement in irrigation water management and the operation and maintenance of the irrigation infrastructure will be based on established, well functioning WUAs. This engagement of the water users themselves is expected to instill a greater sense of individual and community responsibility and even encourage measures to protect the surrounding environment (protection of vegetative cover, planting of trees).

Finally, the EA signals the fact that **APNIP** incorporates elements that are identified by the GOKR in its **Second National Communication on Climate Change (2009)** as climate change adaptation measures (e.g. improved water resources management, increases in irrigation system efficiency, reduction in water losses, incentives for water users, etc.) and includes them in the analysis of environmental impacts, preventive actions, and mitigation measures in **5.2.4** below.

5.1 Anticipated Positive Environmental Impacts

5.1.1 Reduction in Water Losses. Estimates are that significant amounts of the water currently entering the irrigation systems are lost as a result of infiltration, canal leakage, evaporation, unmanageable control structures due to missing gates, and inefficient on-farm use of water. These water losses from the system contribute in some places to the high levels of groundwater, the salinity of the soils, and the occurrence of waterlogging in low-lying areas. Experience from **OIP-1** and **OIP-2** suggests that the irrigation and drainage improvements of **APNIP** will help curb many of these water losses. For example, an impact assessment of 13 WUAs where rehabilitation works were completed under **OIP-1** showed that the water abstraction per unit of irrigation area was down in 10 of those WUAs as much as 20 percent or more. Thus the rehabilitation/lining of irrigation canals and installation of control structures under **APNIP** should permit better management and monitoring of water delivery, prevent significant water leakage, and minimize water erosion. The reduction in losses and improved irrigation distribution on-farm will, besides improving the equity among farmers, reduce seepage losses and over-supply of irrigation, with beneficial effects for the area: a lower water table, and a lower risk of waterlogging and soil salinity. Finally, measures resulting in reduction in water losses are identified by the GOKR as key adaptation measures for the impacts of climate change on the country.

5.1.2 Enhanced Water Resources Management. The semi-arid climate of the Kyrgyz Republic makes its agriculture heavily dependent on irrigated cultivation and should provide ample incentive for rational management of water resources. Yet, the general deterioration of irrigation systems and control structures, coupled with the general lack of understanding of effective on-farm water management practices, has resulted in widespread mismanagement of irrigation water resources. The installation of better irrigation water measurement and control structures and the delivery of training and extension on on-farm water management to WUA members under **APNIP** should significantly improve water resources management. Again, more effective management of irrigation systems is identified by the GOKR as an adaptation measure for climate change impacts.

5.1.3 Increased Agricultural Productivity. Agricultural productivity, as a whole, has declined over the years, in large part because of the significant deterioration of the irrigation and drainage systems. The direct results of this deterioration have been decreasing delivery of irrigation water, increasing water losses, decreasing fertility of soils, expanding areas of fallow agricultural land and rising groundwater levels in some places. The infrastructure improvements planned under **APNIP** should help restore and improve productivity by increasing the actual net delivery of irrigation water (reducing water losses), improving the fertility of soils, and expanding the area of agricultural lands returned to production. Furthermore, the strengthening of the WUAs should improve water resource and soil fertility management and promote consistent operation and maintenance of irrigation and drainage systems.

5.1.4 Improved Soil Fertility. Drainage system improvements undertaken by **APNIP** should have positive impacts on the areas of poorly drained agricultural land found in some places. Although most of the Kyrgyz Republic has adequate drainage, there are some areas, particularly in the Ferghana Valley and the western part of Chui Oblast, where high groundwater levels pose problems with soil salinity. The depth of the groundwater is critical for the incidence of secondary salinity in the soil, particularly where the groundwater itself is saline and accumulated salts in the soils are not periodically leached. Regular leaching of the soils has stopped in some areas. Reducing soil salinity would improve yields of most salt-sensitive crops and increase agricultural productivity. Improving soil fertility by reducing soil salinity and using other soil management practices are critical to climate resilience and represent additional climate adaptation measures.

5.2 Potential Negative Environmental Impacts

Potential negative impacts of the project would include: (i) construction-related damage caused by contractors during construction activities, including dumping of excavated sediments and other materials from irrigation canals and drainage collectors; (ii) a long-term risk of surface water contamination from agrochemical pollution resulting from an increased use of pesticides in the future; and (iii) soil erosion associated with existing practices of agricultural production. Further, as the proposed project is in the upper watershed for the Aral Sea basin, there is a need to guard against any possible ecosystem and hydrological system issues, including the international waterways issues.

5.2.1 Construction Impacts. The infrastructure improvements under **APNIP** for the most part will involve rehabilitation of on-farm (tertiary) canals and drains at selected sites. All civil works will be designed and operated in accordance with environmentally sound engineering practices and governed by the applicable environmental standards of the Kyrgyz Republic. These works will require the use of heavy machinery (i.e. excavators, bulldozers), but will be small in scale and will take place on lands already under agricultural use. The principal construction impacts will involve management of dredged sediment and construction debris but may also include: (i) interference with access and movement; (ii) disturbance of agricultural activities resulting from access restriction, soil compaction, and trenching; (iii) waste, noise, mud, and dust at sites and on

access roads; (iv) damage to trees or other vegetation along canals; and (v) disturbance of wildlife at sites close to ecologically sensitive areas.

Recommended Preventive Actions or Mitigation Measures. The EA recommends a combination of preventive actions and monitoring to minimize the potential construction-related impacts described above. First, a site-specific environmental management plan (EMP) will be prepared by the design consultants for each WUA-managed irrigation system, which will describe in detail the measures proposed to prevent or mitigate construction-related environmental impacts. Guidelines for preparing these EMPs are contained in Annex B. Among other things, the site-specific EMPs will determine whether the irrigation schemes fall under the command of small irrigation dams or water storage reservoirs that would trigger the IDA safeguard policy on Safety of Dams. Those irrigation systems that do fall under such potential hazards will follow special guidelines developed for this purpose (see Annex C). These site-specific EMPs will be reviewed by the SAEPF in order to ensure compliance with its SEE requirements before any financing or construction can begin at the irrigation system.

Second, all construction contracts will have standard environmental, health and safety clauses required by Kyrgyz legislation and IDA procedures (see Annex D for model environmental contract clauses). These two preventive measures should address any potential adverse impacts from the rehabilitation activities.

Monitoring. As was done under prior projects, the Raion Support Unit (RSU) engineers will conduct site inspections prior to, during and upon completion of construction activities to ensure full compliance with the site-specific EMP and contract conditions. Final payment to the contractor should be contingent on the final inspection, with particular attention to the requirement to restore the site to its original condition upon completion of construction activities. The environmental monitoring of the construction sites will include regular sampling of water within and around the construction sites; the involvement of the SAEPF in monitoring and evaluation will help in developing systematic environmental monitoring on rehabilitated sites. Provision of basic sampling equipment and training by **APNIP** will help to improve the long-term monitoring of water quality by DWR.

5.2.2 Water Quality Impacts. There is some potential risk of pollution of water resources (surface and groundwater) from irrigation drainage water discharged into the river systems in the Kyrgyz Republic. This pollution might come from two main sources: (i) increased drainage with high salinity in the near-term from saline soils; and (ii) increased agrochemical pollution in the longer term from improper application of pesticides as agricultural production increases in the future. Besides the potential ecological damage to the receiving waters, this pollution may result in public health problems where rural households take water from these sources for domestic use.

The drainage improvements in some of the high-salinity areas rehabilitated by the project will likely result in a modest increase in the salinity of waters in the drainage collectors. Waters from the collectors are pumped directly into the neighboring rivers or streams, but the impacts of these discharges will likely be negligible. The case of agrochemical pollution is more complicated. Although there is no solid evidence of the misuse of agrochemicals on farms in the Kyrgyz Republic, the water quality monitoring program set up under **OIP-1** found residues of pesticides in the receiving waters at some locations (Naryn and Talas Rivers). Furthermore, it must be recognized that the future recovery of the agricultural sector in the project areas (dependent not only on increased agricultural production but also on improved rural economic conditions, expanded access to markets and higher agricultural prices) may lead to an increased use of agricultural chemical inputs and result in increased water pollution in the long term. The awareness of most farmers of the ecological and health risks associated with pesticide use is low,

so there is some risk of improper management or over-application of pesticides and consequent contamination of surface and groundwater resources.

Recommended Preventive Actions or Mitigation Measures. The EA recommends preventive actions rather than mitigation measures to address these potential sources of water pollution. The **APNIP** should ensure that farmers in the project WUAs receive information, training, and extension services on proper irrigation and agricultural practices in order to: (i) minimize impacts of drainage from saline soils; and (ii) promote the use of safe pest and pesticide management practices, including integrated pest management (IPM), and proper application of pesticides. WUA training planned under **APNIP** should address the former, but the latter should be addressed through project coordination with existing Rural Advisory Services (RAS) training programs or with the extension and advisory activities under the IDA Agricultural Investments and Services Project (AISP).

Monitoring. The RSU should ensure that the WUA training programs include adequate farmer training on the above topics. The RSUs should also make routine site inspections to high saline lands to ensure that proper management practices are being used to restore saline soils. Finally, the RSUs should continue the periodic water quality monitoring program initiated under **OIP-1** to monitor the quality of water (salinity, presence of petroleum products or agrochemicals) discharged into rivers and streams.

5.2.3 Impacts on Agricultural Soils. Although minor, there is some risk of increased soil erosion associated with existing agricultural practices in some areas of the Kyrgyz Republic, particularly where irrigation waters reach the farms at high velocity during flood periods from high mountain sources. When this occurs the irrigation waters have a scouring effect on unlined canals and irrigation structures, in some cases causing severe soil erosion, destabilizing banks and digging pits and holes. Although not widespread, the potential for these problems (and their likely increase in frequency and severity as a result of climate change) should be recognized in the planning stages of rehabilitation and addressed in the site-specific EMP with appropriate preventive measures.

Recommended Preventive Actions or Mitigation Measures. The EA again recommends preventive actions rather than mitigation measures to deal with the potential risks of soil erosion. The **APNIP** should ensure that farmers in the project WUAs receive information, training and extension services on proper irrigation and agricultural practices necessary to minimize impacts of soil erosion in areas prone to these problems (particularly areas likely to bear the impacts of climate change). As with the previous projects, WUA training planned under **APNIP** will address improved on-farm water management practices and should address soil management practices to the extent possible. Otherwise, this should be addressed through project coordination with existing RAS training programs.

Monitoring. The RSU should ensure that the WUA training programs include training for farmers on proper soil management. The RSUs should also make routine site inspections to erosion prone lands to ensure that proper management practices are being used and, where rehabilitation activities are planned, that anti-erosion measures included in the site-specific EMP are undertaken.

5.2.4 Impacts of Climate Change. As noted above, the GOKR recognizes the significance of the potential impacts of **climate change** on its environment and natural resources, particularly its water resources and agriculture. In its **Second National Communication to the UN Framework Convention on Climate Change (2009)**, the GOKR catalogues the available evidence on climate change impacts on the country's economy, resource base and population. It forecasts a significant reduction in surface water flows in the coming decades, with resulting effects on conditions of life and economic activities in the country. It anticipates a rise in temperatures affecting agriculture,

with climate conditions ranging from moderately hot in the Northeast and Tien-Shan regions to very hot in the Northwest and Southwest regions of the country. It also estimates a rise in the frequency of climatic emergencies (extreme events) in the high mountainous landscape of the country, including landslips, landslides, rockslides, mud-flows, high water, avalanches, earthquakes and other hazards. The report, among other things, includes a detailed sector by sector analysis of anticipated climate impacts (vulnerability assessment) and identification of various adaptation measures. Of relevance to the **APNIP**, is the report's analysis of impacts and measures for surface water flows, agriculture and climate emergencies. Excerpts on these topics follow.

Surface water flows Adaptation measures: Climate change adaptation activities aimed at water resources basically are determined by particularities of water consumption. The basic sector consuming water resources in Kyrgyzstan is agriculture which uses 92-96 percent of water for the purpose of irrigation during recent years. Selecting adaptation actions, it is necessary to take into account the anticipated reduction of surface water-flow and also emergency climatic situations that currently cannot be predicted. It amplifies the negative effect caused by reduction of surface water-flow. However, there are good reasons to believe that floods will be stronger and longer while droughts -more frequent and extensive. Detailed stages of adaptation process should be concretized for each region, but in any case the general actions are:

- more effective and careful management of irrigational systems in order to preserve and reduce water loss;
- regulation of surface water-flow and creation of water reserves in artificial water reservoirs;
- implementation of modern, more effective systems and modes of water distribution in order to reduce its losses;
- incentives for water-users to urge them to use efficiently the available water resources by implementation of paid water use system.

Agriculture Adaptation measures: In general, the actions aimed at climate change adaptation of agriculture are well known and successfully implemented in many countries. For successful realization of adaptation strategy it's necessary to prove the choice of concrete measures and to design clear sequence of actions on adaptation on the basis of general approach for each region of the Kyrgyz Republic. The basic directions of general approach are as follows:

- diversification of crop and cattle livestock varieties tolerant to expected climate change;
- alternation of plant cultivation and cattle breeding regional priorities;
- implementation of efficient irrigation practice;
- change of agriculture works timing due to change of vegetative period duration
- and heat availability.

Climatic emergency situations Adaptation measures: Adaptation actions should develop the existing set of actions aimed at prevention of emergency situations. The basic components of these actions are:

- Spatial planning of all emergency situations including identification of danger zones and requirements for use of these zones;
- Engineering actions aimed at elimination of hazard source and preconditions.

The EA recognizes that a number of the measures identified by the GOKR above in the analysis of climate impacts on water resources and agriculture are relevant to **APNIP** and should be incorporated into the proposed project. In fact, as noted above, key measures (e.g. reducing water losses, improving water resources management, increasing irrigation system efficiency, etc.) are already included in the analysis of environmental impacts, preventive actions, and mitigation measures in the EA.

6. ENVIRONMENTAL MANAGEMENT PLAN

The EMP contained in this section is the management tool that ensures that the environmental prevention and mitigation measures identified in the EA will be properly undertaken during implementation of the proposed project. The EMP also includes the monitoring plan and institutional strengthening activities designed to help ensure that the project will have beneficial impacts on the project areas. Finally, the EMP establishes the necessary institutional arrangements and proposes a schedule for implementing these activities, and it indicates their costs in the proposed project budget.

6.1 Mitigation Plan

The preventive actions and mitigation measures recommended by the EA above are shown in the mitigation plan in Table 5. The plan identifies these measures according to the phase of project implementation in which the potential impacts are likely to occur:

- the construction phase, which covers the actual civil works financed by the project at selected irrigation and drainage systems and involves the immediate construction impacts and sediment/waste disposal impacts described in Section 5.2.1 above; and
- the operational phase, which covers the period after construction of the civil works has been completed and operation of the rehabilitated system resumes, which involves the continuing and longer-term impacts on water and soil quality.

The plan then identifies the recommended preventive actions and mitigation measures, estimates the costs of installation (e.g. purchase price for any equipment) and operation (e.g. operating costs for any equipment or sampling/monitoring) for these measures where appropriate and assigns the institutional responsibility (e.g. PIU/OSU/RSU or SAEPF) for ensuring that the measures are effectively implemented.

6.2 Monitoring Plan

As part of its overall responsibility for execution of **APNIP**, the PIU will ensure that regular environmental monitoring and evaluation of project activities take place. The PIU should basically continue and reinforce the environmental oversight and monitoring activities initiated under **OIP-1/OIP-2**, while taking steps to institutionalize them within DWR (see institutional strengthening at 6.3 below). Under the previous projects, the PIU contracted a national environmental specialist to draft guidance for environmental oversight of project activities (see guidance document in Annex E), design a project-related water quality monitoring program, purchase field equipment for water sampling, and train engineers in the OSUs and RSUs to conduct the environmental oversight and water sampling.

Under **APNIP** the PIU should reinforce this existing oversight and monitoring program, incorporating the environmental monitoring identified above as part of the preventive actions and mitigation measures proposed to address potential adverse impacts. The results of such monitoring will be recorded, analyzed and maintained by the PIU throughout the life of the project. The PIU will report the results of its monitoring program in the periodic progress reports it submits to IDA. IDA implementation review missions will review the results of the monitoring program on a regular basis.

Table 5: Mitigation Plan

			Cost		Institutional Responsibility		Oversight
Phase	**Issue**	**Preventive Action/ Mitigation Measure**	**Install**	**Operate**	**Install**	**Operate**	
Construction	Construction impacts	Preparation of site-specific EMP; Incorporation of environmental covenants in construction contracts	n/a	to be determined, but part of civil works contracts (tbd)	PIU/ contractors	Contractors	RSU site inspections to ensure compliance; Coordination with SAEPF.
	Sediment management	Appropriate disposal	n/a	tbd	n/a	Contractors	Site inspections as above
	Construction waste	Appropriate disposal	n/a	tbd	n/a	Contractors	Site inspections as above
Operation	Threats to water quality from drainage from saline soils	Training in improved water and saline soil management practices	n/a	n/a	OSU/RSU	WUA members	RSU site inspection to ensure compliance; Coordination with SAEPF
	Threats to water quality from agrochemical contamination	Training in improved pest/ pesticide management practices	n/a	n/a	RAS/ AISP	WUA members	RSU site inspection to ensure compliance; Coordination with SAEPF
	Increases in soil erosion	Training in water and soil management practices	n/a	n/a	RAS/ AISP	WUA members	RSU site inspection
	Climate change impacts	Awareness raising campaign Training in climate adaptation measures	n/a	n/a	RAS	WUA members	RSU site inspection

6.2.1 Oversight of Compliance with Preventive Actions and Mitigation Measures. As initiated under **OIP-1/OIP-2**, the RSU will be responsible for overseeing proper implementation of the various preventive actions and mitigation measures required by the EA above, by the site-specific EMP, or by the SAEPF. This will entail periodically making site visits to verify that the appropriate preventive actions and/or mitigation measures have been implemented. The RSU also will conduct random evaluations of project sites to determine the effectiveness of measures taken and the impacts of project activities on the surrounding environment.

6.2.2 Monitoring of Ecological and Social Indicators. During the life of the **APNIP**, the PIU, through the OSUs and RPUs and with the collaboration of SAEPF, will carry out periodic monitoring and analysis of the soils, water resources, ground water levels, and mineralization at sites where project rehabilitation works take place. This will include the ecological monitoring activities identified above in the EA or in the site-specific EMP as part of the preventive actions and mitigation measures proposed to address potential adverse impacts. As detailed in the monitoring plan in Table 6, this monitoring will include regular analysis of:

- the quality and quantity of drainage waters discharged, i.e. analysis of mineralization, pH, temperature, and turbidity (as initiated under **OIP-1/OIP-2**);
- the quality of selected receiving waters, i.e. analysis of chemicals and pesticides (as initiated under **OIP-1/OIP-2**); and
- the quality of soils, including salinity and humus content (content of phosphorus, potassium, nitrogen), groundwater levels, and mineralization, where needed.

As initiated under **OIP-1/OIP-2**, the water management specialists in the RSUs will take samples of water at selected project sites using the field equipment provided by the project, keep records of the results, and report these results periodically to the PIU. Samples taken for chemical analysis will be sent to the national laboratory contracted under the project for laboratory analysis. The PIU will analyze and report on the results of the water quality monitoring program on an annual basis, recommending appropriate preventive actions or mitigation measures where the results warrant such actions.

6.3 Institutional Strengthening

In order to ensure proper implementation of the various environmental activities (preventive actions/mitigation measures, monitoring) recommended in this EMP, **APNIP** will provide the any institutional strengthening to the PIU/OSU/RSU and DWR necessary to sustain and reinforce the institutional strengthening provided by **OIP-1/OIP-2** in recent years. This will include continuing support for public outreach on environmental management issues to the WUAs and WUA members. The institutional strengthening may include the delivery of technical assistance and training, the purchase of necessary sampling and monitoring equipment, and support for public outreach/awareness activities. One of the goals of the project is to institutionalize these environmental activities within DWR. Each of these activities is described below.

6.3.1 Technical Assistance and Training. As was done under **OIP-1/OIP-2**, the PIU will recruit an environmental specialist on a part-time basis to provide technical assistance for implementation of all environmental oversight and monitoring activities identified in the EA and EMP. Specifically, the specialist will organize appropriate environmental training for the water management specialists in the CSU, OSU and RSU, both to raise environmental awareness and to strengthen overall environmental management capacity in the project team. This training will address the specific technical skills necessary to perform the environmental oversight and monitoring functions required.

Table 6: Ecological Monitoring Plan

						Cost		Responsibility	
Project Phase	**Parameter**	**Location**	**Method/ Equipment**	**Frequency**	**Purpose**	**Install**	**Operate**	**Install**	**Operate**
Baseline	mineralization, pH, turbidity	Head, middle, tail of irrigation system	field sampling equipment	before, during, after growing season	measure impacts of civil works	0	negligible	RSU sampling	RSU sampling
	chemicals, pesticides	selected points on receiving waters	sampling for laboratory analysis	before, during, after growing season	measure impacts of agricultural practices	0	8,000 US$	RSU	RSU
Construction	Site-specific EMP; Environmental contract clauses	Rehabilitation sites	Site inspections	before, during and after completion	Ensure compliance	0	negligible	n/a	RSU
	mineralization, pH, turbidity	Head, middle, tail of irrigation system	field sampling equipment	before, during, after growing season	measure impacts of civil works	0	8,000 US$	RSU sampling	RSU sampling
Operation	Soil salinity, humus content	Problem areas	Soil sampling/ analysis	Quarterly	Determine any improvements in soil quality	0	negligible	n/a	RSU/ SAEPF
	Groundwater levels	Problem areas	Water gauge measurement	Quarterly	Determine water levels	0	negligible	n/a	DWR
	mineralization, pH, turbidity	head, middle, tail of irrigation system	field sampling equipment	before, during, after growing season	Determine quality of water discharged	0	negligible	n/a	RSU sampling

Additionally, the environmental specialist will support environmental outreach activities for WUAs and WUA members, raising their awareness of on-site compliance with environmental requirements and the results of water quality monitoring activities.

6.3.2 Equipment. APNIP will replace field sampling and analysis equipment as necessary to support the water quality monitoring program. The project may also purchase additional equipment determined necessary to strengthen the monitoring program. Finally, the project may further enhance the PIU's geographic information system (GIS), which should serve for irrigation design purposes, mapping the monitoring network, displaying environmental monitoring results, and identifying areas of particular concern.

6.3.3 Public Outreach and Awareness. APNIP will also support better outreach to the WUAs and WUA members and dissemination of information on the environmental compliance and water quality monitoring activities of the project and DWR. New to the **APNIP** will be awareness raising on the potential impacts of climate change and appropriate adaptation measures that WUA members should take (e.g. good/climate smart agricultural practices, water conservation methods, changes in cropping patterns/varieties, early warning systems, etc.). This support will include meetings or workshops with WUAs organized at the oblast level, distribution of printed material on water quality monitoring or other public outreach and information activities of this nature.

6.3.4 Capacity building in DWR. Finally, as with **OIP-1/OIP-2, APNIP** will provide technical assistance to institutionalize the project's environmental oversight and monitoring activities within the Technical Expertise and Investment Unit (TEIU) of DWR, which has responsibility for providing state technical expertise (examination) of proposed investment projects in the water resources sector and for monitoring compliance with technical specifications. To this end, the environmental specialist will provide any on-the-job training to technical personnel in the central and oblast offices of DWR necessary for them to assume their environmental management responsibilities. This will include additional technical training in water quality monitoring and analysis for these personnel, as needed.

The set of activities included in this institutional strengthening program is presented in summary form in Table 7.

Table 7: Institutional Strengthening Program

Component	Activity/Unit	Recipients
Environmental consultant services (on part-time basis for life of project)	Technical assistance for implementation of environmental oversight and monitoring activities	PIU/OSU/RSU water management specialists TEIU technical specialists
Training	Oversight of on-site compliance with environmental requirements, water/soil sampling for monitoring program	PIU/OSU/RSU water management specialists TEIU technical specialists
Public outreach and awareness	Environmental compliance and water quality monitoring Awareness raising on climate change and adaptation measures	WUA members
Equipment	Field sampling and monitoring equipment	OSU/RSU water management specialists

6.4. Schedule

Implementation of the activities described in the EMP will begin in the first year of project implementation, with an immediate review and refinement of the details of the mitigation plan, monitoring plan, and institutional strengthening program proposed above. The PIU, with the support of the environmental specialist, will then ensure implementation of the mitigation and monitoring plans and institutional strengthening program, as appropriate given the schedule of infrastructure rehabilitation at selected WUAs under the project. The mitigation measures for construction impacts, for example, will obviously track the pace of infrastructure rehabilitation. These activities will continue, as appropriate, throughout the life of the project.

The institutional strengthening activities will take place over the life of the project, on the basis of identified needs, with scheduled training for PIU/OSU/RSU water management specialists occurring early in project implementation, followed by the outreach and public awareness activities with the WUAs. The environmental specialist will be provided to the PIU on an as-needed, part-time basis for the life of the project. The monitoring plan will be implemented throughout the life of the project based on the schedule of rehabilitation activities, with periodic monitoring used to evaluate the impacts of mitigation measures and track baseline environmental conditions in the project area. Most of the purchase of field equipment should take place in the first year of the project, but additional needs may be identified at later times.

The proposed schedule for implementing EMP activities is shown in Table 8.

Table 8: EMP Implementation Schedule

EMP Activities	Year 1	Year 2	Year 3	Year 4	Year 5
Mitigation Plan:					
-- Oversight of construction impacts					
Monitoring Plan:					
-- Water quality	(baseline)	(baseline)			
-- Groundwater level	(baseline)	(baseline)			
-- Soil quality	(baseline)	(baseline)			
Institutional Strengthening:					
-- Technical assistance (env. consultant)	2 mo.	1 mo.	1 mo.	1mo.	1mo.
-- Training					
-- Purchase of monitoring equipment					
-- Public outreach and awareness to WUAs					

Note: baseline survey is spread over two years, based on the time needed to select all WUAs.

6.5 Institutional Arrangements

Responsibility for implementation of the EMP will be shared by DWR, the PIU, and SAEPF. DWR, working through the PIU, will have overall responsibility for implementation of **APNIP** and will ensure that the EMP is fully integrated into implementation of the project, including the monitoring and reporting required by IDA. More specifically:

- The PIU will assume responsibility for: (a) the design and assessment of the physical works in accordance with Kyrgyz environmental norms, regulations and requirements; and (b) the physical implementation of the activities under the project. The PIU's engineers and externally engaged design engineers will assume the primary responsibility for providing designs and for preparation of the bidding documents with specifications taking into account environmental protection requirements. Contractors

will be responsible for implementation of the rehabilitation works in accordance with environmental requirements specified in the site-specific EMP and bidding documents;

- The PIU's environmental specialist will work to ensure that all preventive actions and mitigation measures identified by the site-specific EMP are undertaken in a proper and timely manner and will take the necessary actions to monitor their effectiveness. To the extent feasible, the local SAEPF staff in the project raions will assist the environmental specialist in monitoring implementation of the mitigation plan. Where it becomes apparent that different or additional measures are required to minimize potential negative impacts, the environmental specialist, with the advice of the SAEPF staff, will recommend such measures to the PIU;
- The environmental specialist will also oversee implementation of the ecological monitoring plan specified in the EMP, ensuring that the monitoring assigned to the OSU and RSU water management specialists is performed effectively and that the information is shared promptly with appropriate project and DWR officials. The specialist will package the results of the ecological and social monitoring in annual reports to the PIU Project Coordinator, national and local GOKR officials, and IDA staff; and
- The environmental specialist will directly manage the institutional strengthening activities recommended by the EMP, including scheduling training, overseeing the purchase of equipment, and managing efforts to raise public awareness.

DWR and SAEPF will work closely with the PIU in implementing the EMP. In particular, DWR will support the environmental specialist in institutionalizing these environmental activities in the TEIU through training and technical assistance.

SAEPF, through its state ecological expertise functions, will be the primary monitoring agency for **APNIP** activities and will support the environmental specialist in assessing the environmental impacts of project activities, evaluating the effectiveness of the preventive actions, and mitigation measures taken and performing the ecological monitoring assigned.

Finally, the WUAs will collaborate with the environmental specialist to ensure that environmental considerations are incorporated into their activities, not only in the rehabilitation, operation and maintenance of irrigation and drainage infrastructure but in improved practices for agricultural, water, and soil resources management among their members.

7. CONSULTATION WITH BENEFICIARIES

Environmental Screening Mission. As noted above, the GOKR's original GAFSP proposal benefited from an extensive public consultation process that involved more than 500 people from various agencies of the GOKR, non-governmental organizations, potential project beneficiaries and international agencies active in the country. This consultation process provided valuable inputs into the design of **APNIP**. This was followed more recently by additional public consultations on the environmental management aspects of **APNIP**. To this end, a World Bank environmental specialist carried out informal consultations with various relevant stakeholders and beneficiaries of the proposed project during an environmental screening mission in February 2013. Meetings were held with officials in the PIU in Bishkek, the DWR and its OSU and RSU offices in (Osh and Batken) Oblasts, and the SAEPF. While in the field, the mission met with WUAs, their officers and members, and with farmers and other beneficiaries (and potential beneficiaries) in several raions in (Osh and Batken) Oblasts.

8. PROPOSED BUDGET

The estimated costs of implementing the various activities specified in the EMP are displayed in Table 9. The costs are broken down in terms of personnel expenses (i.e. the part-time environmental specialist), institutional strengthening expenses (i.e. training, outreach), monitoring program expenses (laboratory analyses), and equipment costs.

APNIP will finance these expenses as part of the project budget. The project should make every effort, however, to ensure that the GOKR shares some of the costs that support government functions (e.g. monitoring by the OSUs and RSUs). The costs of the EMP will be included in the total costs of the **APNIP** and will be financed with funds from the IDA grant. No additional costs are envisaged in implementation of the EMP.

Table 9: Proposed EMP Budget

EMP Category	Quantity	Unit Rate (US$)	Cost (US$)
Personnel:			
PIU environmental specialist (part-time over 5 years)	5 m*	800/m	4,000
Institutional Strengthening:			
- training, workshops, etc.	5	2,000	10,000
- public outreach/awareness campaigns	5	1,000	5,000
- additional financing	3	3,000	9,000
Monitoring Program Expenses:			
Laboratory costs (based on OIP-1 costs for one year)	5 yrs.	9,000	45,000
Field Monitoring Equipment:			
- universal device (TDS/EC, pH, salinity)	10	220	2,200
- microprocessor devise (turbidity)	3	960	2,880
- photometer (oil pollutants)	1	2,520	2,520
- additional financing			5,000
TOTAL - APNIP			81,600

* person months of labor

ANNEX A: INSTRUCTION ON STATE ECOLOGICAL EXPERTISE (1997)

Section 5. EIA Procedure Stages

Stage 2. Environmental impact assessment.

This stage includes:

- collection and analysis of information on existing environmental condition;
- preparation of information on types of impact, its qualitative and quantitative parameters;
- detection of sources and objects of impact (their sizes, location relative to other sources, environmental objects);
- forecast of environmental changes and environmental components (water, soil, atmospheric air, flora and fauna, entrails, etc.);
- technological decisions analysis including alternative options;
- assumed impact zone fixing; and
- socio-environmental-economic analysis of intended project aspects (including alternatives).

The determination of project's impact and its alternatives on environment includes the following types of information and research:

- project implementation scale expediency and necessity justification;
- comparative technological and environmental-economic analysis of alternative decisions, their conclusions sufficiency justification;
- project implementation location and time justification;
- availability of resources for main object (raw materials supply, power, natural resources, labor resources);
- technical analysis of design solutions with possible emergency risk analysis at all the stages of object construction, maintenance and liquidation. A technical characteristics sheet (*technological passport*) has to be drawn up on technical analysis findings; and
- present condition of a planned object location environment.

The degree of completeness and sufficiency of information on the nature of environmental conditions in a specific territory must be considered from the standpoint of how well it has been scrutinized and its sensitivity to impacts. The sufficiency of survey must be determined at the site selection stage and implies the availability of information on the types and nature of intended impact.

The information must include the following components:

a) land resources;
b) climatic factors;
c) soil factors;
d) geological, hydro-geological factors;
e) geo-morphological factors;
f) hydrological factors;
g) biological factors (fauna and flora); and
h) background value of contaminating substances in environmental components.

- socio-economic and business aspects of reviewed territory, which include the information on:
    a) demography;
    b) economy;
    c) employment;
    d) historical and archaeological objects;
    e) infrastructure;
    f) transportation;
    g) public organizations;
- cost and benefits analysis;
- basic impact characteristics:
    a) sources of impact;
    b) spatial arrangement;
    c) types of impact:
        direct;
        indirect;
- by type description of impact on humans, flora, fauna, soil, air, climate, landscape, tangible values and cultural heritage, and impact on interrelation of these factors;
- qualitative and quantitative impact indicators:
    a) impact intensity (ingress of contaminants per one unit of time);
    b) impact power density (ingress of contaminants per one unit of square);
    c) impact frequency (discrete, uninterrupted, nonrecurring);
    d) duration (year, month);
    e) spatial dimensions of impact (depth, size, form, impact zones).

Significant types of impact: out of the initial list must be selected the impacts of the highest intensity, longest duration, significant area of impact and those affecting particularly sensitive areas (extraordinarily protected territories);
- impact mitigation measures;
- environmental monitoring program for the entire "life cycle" of the object.

This stages must be completed with the preparation and drawing up of the Environmental Impact Statement (EIS), which must be presented to all the interested parties – authorities, management and supervision bodies and the public.

The environmental and economic assessment.

EIA economic estimates must be done in the following way:

- do complete public cost estimates for proposed options accomplishment considering all the detected effects;
- conduct additional assessment depending on calculation objectives and detected positions, for instance, financial benefits, compensation payments, specific negative effects mitigation or elimination costs, etc.;
- do a comprehensive environmental and economic calculation to summarize all PROs and CONTRAs in terms of cost;
- comment on assessment findings according to the public interests scale and with the use of indicators unavailable in value terms;
- do approximate estimates of object's cost-efficiency with regard for the price development of raw materials, inputs and final products as well as for variable sources of original crude and complete sets of equipment, etc.;
- object's cost-efficiency must be estimated within financial self-sufficiency according to the existing tariffs and prices.

The estimates should include production and sale costs, manufacturing and social infrastructure operations and maintenance costs. The consumption of natural resources and utilization of waste processing and burial services of outside organizations are estimated according to the fixed tariffs under the existing payment procedure.

- cost efficiency is estimated in relation to the project implementation with regard for all the consequences including project cancellation.

Stage 3 – Environmental effects detection

- EIS public hearings organization.
- Public hearings' results registration.

The goal of this stage is to detect environmental, social, economic and other relevant effects of intended activity in this territory at certain time. The detection of effects has to be done with the assistance of EIS public hearings.

The participation of the public is to form different groups' opinions as to the project implementation based on research findings and project information submitted to them.

These public hearings must result in a document (protocol) to be the basis of making changes to the project with additional surveys conducted.

The general criteria of social effects detection may be population's health and security, possible resettlement to other districts, changes in usual living conditions and traditional forms of employment, proximity to recreation zones, natural reservations, archeological, ethnic and historic monuments.

The degree of public concern must be identified based on this information. This information is subject to being a part of EIA materials.

Stage 4 – Project adjustment

The goal of this stage is to forecast environmental condition changes which will follow project implementation. The forecast has to be done for those natural components, which, if impacted, will cause apparent and undesirable effects detected at the EIS preparation stage. These changes may occur to the quality of atmosphere, land resources, surface and underground water, hydro-geological, hydrological, engineering-and-geological, seismic and other conditions.

This stage envisages the development of project monitoring required for control over hardly forecasted environmental changes. The project monitoring is required by the projects, which are not clear about environmental impact and its mitigation measures, when its project proposals implementation is experimental or they may change due to certain circumstances or have the possibility of irreversible changes or the project decision making may change in such a way to end up with quite serious impact.

ANNEX B: GUIDELINES FOR PREPARATION OF SITE-SPECIFIC EMPS

I. Introduction

In every case the site-specific EMP will comply with the requirements for SEE set out in the Kyrgyz instruction cited above in Annex A.

In order to elaborate a site-specific EMP, the preparer must gather the details from the selected site for rehabilitation. The information needed includes the environmental description of the affected area. It is encouraged that the preparer perform a site visit to get acquainted with the environmental characteristics of the location and the specific activities of the project in its different phases, including details on its regular operating procedures (e.g. amount of water diverted from the river at headworks, etc.).

Once all the information is gathered, the preparer should identify the appropriate activities for each of the phases of the project, and identify the relevant impacts due to the environmental characteristics of the sites. Following this, the impacts need to be ranked (see next section), and the EMP responsibilities specified.

The ranking of the impacts is the crucial step for obtaining an effective and efficient EMP. If the impacts are overstated, then unnecessary hurdles and expenses are attached to the project. If, on the contrary, they are understated, then preventable, potentially severe environmental damage can be inflicted.

II. Ranking of Impacts

Once the specific activities of the project, the regular operating conditions and the environmental conditions have been identified, the relevant impacts must be ranked. The characteristics to be used for ranking impacts are shown in the table below.

Impact Characteristics and Their Corresponding Ranking

Impact Characteristic	Ranking
Type	- **Direct**: The impact may occur as a direct consequence of the activities of the project. - **Indirect**: The impact may occur as a consequence of combination of activities of the project and external factors, or due to an output of the project there are changes in the input of another activity (external to the project) that will generate impact. - **External**: The impact occurs due to factors that are not controllable by the activities, or changes in the design of the project.
Duration	- **Short term**: Severe impact but spike situation; duration within one day; or moderate impact with duration less than one month. - **Medium term**: Less than one year. - **Long term**: Greater than one year. - **Permanent**: Continuous.

Timing	- **Immediate**: The impact occurs immediately as the activity is performed. - **Delayed**: The impact manifests after the conclusion of the activity.
Extent	- **High**: Regional extent. - **Moderate**: Several locations are impacted, and/or difficult to contain. - **Low**: Moderate impact but localized and readily containable.
Severity	- **High**: Regulations/environmental standards are broken; or extreme impact and/or potential for global impact. - **Moderate**: Moderate impact over several locations. - **Low**: Minimal impact; or moderate impact but localized and readily containable.
Reversibility	- **Reversible**: If the impact occurs, the environment can be restored to its original condition. - **Irreversible**: If the impact occurs, the environment cannot be restored to its original condition.
Likelihood	- **Certain**: If an activity of the project is performed, the impact will certainly occur. - **High**: It can occur with high probability during normal operating conditions, or traditional methods of performing activities. - **Medium**: Occurs during maintenance activities; or if an action is performed there is medium probability of the impact occurs. - **Low**: Occurs during abnormal/emergency conditions, and it occurrence can be managed. Or, if an activity is performed, is very unlikely that the impact will occur. - **Uncertain**: If an activity of the project is perform, there is no information about the probability of occurrence of the impact.

Once the appropriate ranking has been done, the significance must be determined. If the impact is significant, specific mitigating measures must be identified and implemented. The executing, monitoring and supervising responsibilities must be identified. The EMP plan preparer will have specified all the aspects of the site-master plan.

As practical guidance, to make sure that the ranking symbols used in each of the characteristics is the correct one, an impact is significant if it has any of the following characteristics:
- are extensive over space or time;
- are intensive in concentration or in relation to assimilative capacity;
- exceed environmental standards or thresholds;
- do not comply with environmental policies/ land use plans;
- affect ecological sensitive areas and heritage resources; or
- affect community lifestyle, traditional land uses and values.

Finally, another practical test for significance can be performed by asking the following three questions:
- Are there residual environmental impacts?
- If yes, are these likely to be significant or not?
- If yes, are these significant effects likely to occur?

If the impact is not significant, then the mitigating measures identified in the plan must not be implemented immediately, but it should be monitored to prevent from becoming significant over time.

Model Outline of the Site Specific EMP

Baseline Data

Description of Project Activities

Determine the list of the Activities to be performed during the Construction phase and the O&M phase. The system consists of headworks, a concrete lined canal of 24.9 km in length, and a storage/regulation basin for low flow periods. The proposed works include cleaning of the reservoir (60 percent siltation), construction of new headworks and repair of the canal. This implies location of Construction site, earth movements, and dumping of large quantities of dredged material.

Description of Environmental Characteristics of the Site

For example, the Chon Canal system diverts water from the Chon Issyk Suu River, a tributary of the Issyk Kul Lake. The river has fish in it. The canal is located on an intervened area, mostly agricultural lands.

Description of Regular Operating Procedures of Concern

For example, it is standard practice to divert 100 percent of the river waters for a period of approximately 20 days per year, usually during April.

EMP specifics

A detail of the activities that can generate potential negative impacts and the significant impacts that may be generated are shown in the following table.

Activities and Potential Significant Impacts by Project Phase

Phase	Activity	Impact
Construction	Location of Construction camps	- Soil pollution; - Groundwater pollution;
	Extraction of Construction Material	- Landscape degradation; - Habitat Loss/Fragmentation; - Change in local Drainage Patterns;
	Dumping of Dredged/Excavated Material & Debris	- Landscape degradation; - Habitat Loss/Fragmentation; - Change in local Drainage Patterns;
	Handling of Construction Materials	- Air Pollution; - Workers/Population Exposure;
	Use of Heavy Machinery	- Air Pollution; - Noise Pollution;
	Movement of Trucks (Construction Materials Transportation)	No significant impacts;

Phase	Activity	Impact
	River bed works	No significant impacts;
	Repairs to structures (concrete)	No significant impacts;
	Repair/replacement of gates on structures	No significant impacts;
	Patching of cracks and joints in concrete lining	No significant impacts;
	Cleaning sediment from overpass structures	No significant impacts;
	Cleaning of trash racks	No significant impacts;
	Grading service roads	No significant impacts;
	Repairs to electrical equipment	No significant impacts;
Operation/ Maintenance	Location of Construction Camps	No significant impacts;
	Extraction of Construction Material	No significant impacts;
	Dumping of Dredged/Excavated Material & Debris	No significant impacts;
	Handling of Construction Materials	No significant impacts;
	Use of Heavy Machinery	No significant impacts;
	Movement of Trucks (Construction Materials Transportation)	No significant impacts;
	River bed works	No significant impacts;
	Repairs to structures (concrete)	No significant impacts;
	Repair/replacement of gates on structures	No significant impacts;
	Patching of cracks and joints in concrete lining	No significant impacts;
	Cleaning of trash racks	No significant impacts;
	Grading service roads	No significant impacts;
	Repairs to electrical equipment (e.g. motors on gate hoists)	No significant impacts;
	Machinery Maintenance and Repair	No significant impacts;
	Water Extraction from Rivers	Reduction in downstream flows, affecting depending ecosystems;
	Water Delivery to In-Farm Infrastructure	No significant impacts;
	Motorcycle Traffic between Structures	No significant impacts;
	Office Activities	No significant impacts;
	Transport and storage of "in-kind" payment for WUA	No significant impacts;

Those impacts deemed significant should have the mitigation measures in place in order to have the residual impact being non significant. Those identified as No Significant Impacts should be monitored so that they do not turn into significant as the project is implemented.

ANNEX C: GUIDELINES FOR DEALING WITH IRRIGATION DAMS AND WATER STORAGE RESERVOIRS

I. Applicability

These guidelines apply to all irrigation systems selected for rehabilitation under **APNIP** that fall under the command of small-scale irrigation dams (i.e. less than 15 meters in height).

II. Assessment

APNIP will follow a program approach, with the WUA-managed irrigation systems eligible for rehabilitation under the project to be selected during the first years of project implementation. Therefore, it is not yet known whether there are any systems with water storage reservoirs implicated in the project. However, from experience under **OIP-1/OIP-2** it is likely that several systems will be selected that have small (less than 15 m in height) dams. Once this has been determined for **APNIP**, appropriate actions to ensure dam safety, including more detailed inspections and safety measures, will be taken.

Before any rehabilitation activities can take place under **APNIP** at an irrigation system to which these guidelines apply, the PIU will contract a qualified national design firm to make an engineering and safety assessment of the irrigation dam or storage reservoir in question. The assessment will identify any significant safety issues, propose appropriate remedial measures to improve safety, and provide preliminary cost estimates for implementing the remedial measures. The consultants who will carry out the safety assessment will also look into the potential consequences of dam failure, including such principal criteria as the number of people at risk, and economic assets downstream that should be used to prioritize any intervention aimed at improving dam safety. The consultants will also be retained to provide construction supervision of the rehabilitation works.

III. Remedial Measures

Where the above engineering and safety assessment has identified significant safety issues and has recommended remedial measures, no rehabilitation activities will take place at the irrigation system until the recommended measures have been designed and agreed on. The PIU will contract a qualified engineering contractor, one that has experience with small earthen dams and/or small storage reservoir systems, to perform the remedial measures recommended in the engineering and safety assessment.

IV. Oversight and Certification

The PIU, through the engineering team, will oversee the implementation of any remedial measures performed at irrigation dams or storage reservoirs under the project. Once the remedial measures have been completed to the satisfaction of the PIU, it will issue a statement of certification that such measures have been satisfactorily completed.

ANNEX D: ENVIRONMENTAL CLAUSES FOR CONSTRUCTION CONTRACTS

Environmental clause for bidding documents and contracts:

For environmental damage possibly caused by contractors during construction activities, such as noise, dust, solid wastes, excavated sediments and other materials from irrigation and drainage canals and structures and any damage to natural vegetation, appropriate mitigating measures would constitute an integral part of the design and implementation, including the contracts binding the contractors to carry out the environmental obligations during construction. The standardized environmental clauses will be included in each contract in **APNIP** framework and during the design. **OIP-**1 has developed good environmental clauses for the bidding documents and they will be used for **APNIP** as well. Additional clauses specified by the raions, as needed, will be included in the awarded contract and will provide additional details for following environmental precautionary clauses.

The key mitigating measures against the potential negative impact that is being envisaged under the project EMP with regard to each of the items are as follows.

"The natural landscape should be preserved to the extent possible by conducting operations in a manner that will prevent unnecessary destruction or scarring of natural surroundings. Except where required for permanent works, quarries, borrow pits, staging and processing areas, dumps, and camps, all trees, saplings, and shrubbery should be protected from unnecessary damage by project-related activities. After construction any unavoidable damage should be restored to quasi-original conditions where appropriate.

"The contractor's operations should be performed so as to prevent accidental spillage of contaminants, debris, or other pollutants, especially into streams or underground water resources. Such pollutants include untreated sewage and sanitary waste, tailings, petroleum products, chemical, biocides, mineral salts, and thermal pollution. Wastewater, including those from aggregate processing and concrete batching, must not enter streams without settling ponds, grave filters, or other processes, so as not to impair water quality or harm aquatic life.

"The contractor should ensure proper disposal of waste materials and rubbish. If disposal by burial or fire, it should not cause any negative impact to either the air, soil nor ground water supplies.

"The contractor should minimize air and water pollution emissions. Dust from the handling or transporting of aggregates, cement, etc., should be minimized by sprinkling or other methods. Materials, brush or trees should only be burned when the owners permit, under favorable weather conditions.

The contractor's facilities, such as warehouses, labor camps and storage areas, should be planned in advance to decide what the area will look like upon completion of construction. These facilities should be located so as to preserve the natural environment (such as trees and other vegetation) to the maximum extent possible. After project construction, camps and building should either serve as permanent residences and form future communities, if such use can be foreseen and approved, or be torn down and the area restored to its quasi-original condition in order to avoid deterioration into shanty towns.

Borrow pits should be landscaped and planted according to an ecological design to provide some substitute area for lost natural landscapes and habitats.

ANNEX E: GUIDANCE DOCUMENT FOR ENVIRONMENTAL OVERSIGHT AND MONITORING UNDER OIP

Kyrgyz Republic

Ministry of Agriculture, Water Resources and Processing Industry
Department of Water Resources

ON-FARM IRRIGATION PROJECT

INSTRUCTIONS
ON FORMATION OF SECTION "ENVIRONMENTAL PROTECTION" DURING IRRIGATION SYSTEM'S REHABILITATION DESIGN

1. Instructions for design companies
2. Instructions for Project staff
3. Instructions for Contractors- ongoing contracts

Bishkek – 2005

INSTRUCTIONS
On formation of Section "Environmental Protection"
during design of irrigation system's rehabilitation

These Instructions apply to environmental issues arising in the process of design and rehabilitation of WUA irrigation systems, in accordance with the On-farm Irrigation Project Implementation Plan and are designed for design companies, ORT, Oblast and Raion SU Engineers.

Section "Environmental Protection" in rehabilitation projects shall be compiled taking account of the following requirements to be followed in the process of work performance:

1. What overall impact (positive and/or negative) of proposed works will be on environment (soil, air, surface and subsurface water)? Indicate if there are any new structures to be constructed, or only existing ones to be rehabilitated? The Development Credit Agreement specifies eligibility criteria of farms involvement (Water Users Associations) including such criteria as non-irrigation of new lands or non-extension of existing infrastructure that may cause abstraction of water exceeding specified limits. If impact is positive, reduction of water losses by increasing efficiency of canals, improvement of irrigation system's maintenance, decrease of soil salinity, inundation and still water as a result of drainage system improvement, etc. shall be noted. If impact is negative (possible increase of soil erosion, groundwater level, etc.), specific design decisions aimed at mitigation of negative effect shall be given.
2. Specify measures/arrangements to be taken to decrease negative environmental impact during construction. Give specific measures/arrangements to protect soil, landscape, surface water sources and atmospheric air.

Soil Protection
Negative impact on soil may include impoundment, salinity, erosion and pollution.

If groundwater level is not deep, intensification of irrigation may cause impoundment. Indicate any taken drainage actions to prevent it.

Risk of soil erosion is higher on the sections with high gradient. Describe technical decisions, if provided by the project, to decrease irrigation water velocity.

What measures are provided to prevent disorderly discharge of sediments/debris and other materials excavated from canals, drains and structures? Sediments and other materials shall be stored in appropriate places, embankment and site. Indicate where and how.

Prior to site preparation it is necessary to remove and store fertile layer. Upon works completion it shall be put back.

What actions are undertaken to prevent soil pollution by fuel during construction? For instance, fuel storage site shall be fenced; profiles of slope base shall protect from seepage losses equal to capacity of all tanks and/or containers located on each site and have sufficient height to keep storm rainfall. Bordered sites shall have watertight screens. Sites used for filling purposes shall have watertight gasket buried under ground layer.

Indicate where and how fuel to be stored.

Waste products, including but not limited to, defect, rubbish, wastes, industrial wastes, fuel-polluted ground, shall be recycled by the Contractor by burying on appropriate disposal site approved by the Kyrgyz legislation. Disposal sites shall be agreed with local sanitary and epidemiology services. Indicate location of disposal sites and who agreed with. Toxic waste products (oil, rag, etc) shall be burnt. If possible, agreement to burn waste products with the nearest boiler-house shall be entered.

Air Protection

Quantity of dust caused by work performance or transportation of units, cement, etc. shall be reduced by the Contractor up to minimum by watering or using other methods. Indicate specific measures/arrangements provided by the project. If possible, avoid burning of rubbish and construction materials. In the process of welding and cement work performance different hazardous substances and cement dust are discharged to the air. Local ecologists may demand, on legal grounds, for calculation of discharged substances and submit payable accounts.

Landscape Protection

Indicate what measures are undertaken to preserve natural landscape so that avoid any destruction, harm or damage of environment on the site. Except for the sites where cutting is required to perform permanent works and provide for access roads all trees, bushes, vegetation, fences and walls shall be preserved and protected from damage, which may be caused by the Contractor's construction and rehabilitation activities and machinery. Travel of people and movement of equipment on the site where access is available to and along routes provided to make access available to the site shall be such as to minimize damage caused to pastures, agricultural crops and other ownership. The Client shall get special permission to cut trees, bushes and fences.

Where possible, existing pits shall be used to extract necessary additional materials.

In accordance with Item 3, Clause 80 of the Water Code of the Kyrgyz Republic dd. 12 January 2005 No. 8 "In case of repair or rehabilitation works felling of bushes and forest plantations within right-of-way borders of water facilities and canals, as well as sanitary deforestation and deadwood felling shall not require agreement of specially authorized state bodies".

What measures are to be taken to compensate losses of the farmers (re-vegetation of soil and vegetation layer, re-seeding, transplanting or recovery to prevent causing of further losses)?

Surface and Subsurface Water Protection

Indicate measures to be taken to prevent inflow or spill of solid substances, pollutants, debris and polluting reagents to the streams, dried and existing water courses, lakes and subsurface water sources. Provision of necessary sanitary facilities (toilets, shower rooms); at that these facilities shall locate outside of sanitary protection area of water courses or reservoirs (See Annex 1).

Any use of pumping, drainage or earth deposits and stone as protective measures to control erosion and silting and as measures promoting subsidence of sediments of surface run-off. How inflow of wastewaters resulted from main construction activities (such as collection of drainage water, aggregation, concrete mixing, drilling, cementation and other) to watercourse or dried riverbed is prevented? How wastewater turbidity is controlled? Any wastewater is diverted from the slopes of upper area?

The project shall provide for working site with machinery, concrete mixtures and tanks to store fuel to be placed outside water protection zones and strips. In accordance with the Regulation on Water Protection Zones and Strips of Water Bodies in the Kyrgyz Republic (See Annex 1) water protection zone shall locate, at least, 50 m from watercourses, dried riverbeds, lakes, swamps and other water sources. Water protection strips for arable lands shall range 10 to 50 meters.

Vegetation Protection
How many trees and bushes shall be cut to perform proposed works? If trees, bushes, etc subject to cutting locate outside of right-of-ways it should be agreed with local forestry departments. Cost of trees cutting shall be included into the estimate. Indicate measures/arrangements provided to protect vegetation from damages caused by the Contractor's activities, staff or machinery (using protection fences or any other methods approved by the Project Manager or Project Supervisor). The Project Manager or Project Supervisor shall approve cutting of vegetation not agreed before.

Damaged vegetation shall be immediately recovered or treated in accordance with recommendations or under supervision of an experienced gardener or agronomist recommended by the Contractor and approved by the Project Manager or Project Supervisor.

Any tree or bush that is not necessary to be cut and, to the Project Manager's or Project Supervisor's opinion, has been damaged as a result of the Contractor's activities, staff or machinery, shall be cut or replaced by the Contractor. It should be replaced by similar species most acceptable for specific natural conditions. Transplanted trees shall be cared of, watered and cultivated within 1 year since transplanting.

Protected Species of Plants and Animals
Individual species of flora and fauna of the Kyrgyz Republic are protected by the government. In accordance with the law, the Project Manager or Project Supervisor shall get permission, and Contractor to transport specified species outside of the working site. Otherwise, the Contractor shall cooperate with relevant government bodies to prevent any harm and trouble to protected species of flora and fauna on the construction site.

ANNEX 1

Note: here are clauses of the Regulation that relate to On-farm Irrigation Project only

APPROVED by the Government Resolution dd. 7 July 1995, No. 271

REGULATION ON WATER PROTECTION ZONES AND STRIPS OF WATER BODIES IN THE KYRGYZ REPUBLIC

I. General

Clause 5. Borders of water protection zones and coastal strips shall be shown on maps and layouts of landowners of water fund and water protection zones, farmland utilization plans, as-built drawings, etc. Specifically coastal strips shall be marked by clearly visible symbols only in the raions of towns, industrial centers, recreation areas and intensive agricultural land use.

Clause 6. Requirements of this Regulation shall be observed when determining size of water protection zones and strips and norms of activity performance.

III. Main Requirements

Clause 10. Within water protection zones and strips of water bodies it is prohibited to:

a) Arrange cattle-breeding farms and complexes, battery farms, sewage ponds, irrigation systems using dung-contained wastewater, burial ground of cattle, dung storage site, disposal sites, machine shops, also maintenance points, fuel stations and car wash;
b) Place tanks to store fuel, construct storehouses for pesticides and fertilizers, sites where pesticides to be filled;

c) Arrange sewage disposal plants and other facilities negatively impacting on water quality;
d) Place non-used pesticides, its remains and waste products, and packaging materials polluted with pesticides;
e) Cut trees and bushes, except for cutting so that care of forest and sanitary cutting;
f) Use fertilizers on snow cover; use of non-neutralized dung-contained wastewater as fertilizers; use of permanent chlorine organic pesticides;
g) Irregularly pasture cattle, especially in drainage system;
h) Dispose of untreated wastewater to reservoirs, rivers, gullies and ravines with permanent or temporary watercourses;
i) Wash floodplain lakes and former riverbeds; arrange pits without agreement of state supervision bodies of environment and natural resources use; and
j) Perform other works negatively influencing on condition of water bodies;

In addition to limitations specified above it is also prohibited to:

k) Arrange recreation areas, camps; and
l) Park and wash cars and farming machinery.

IV. Water Protection Zones

Clause 12. Water protection zone is an area adjacent to water bodies where special activities are established to prevent pollution, exhaustion and silting. Water protection zone consists of river floodplains, up-floodplain terraces, edges and steep slopes of the banks, also gullies and ravines bordering upon water body.

Clause 14. An outer border of water protection zone is determined depending on the utmost border from water body defined by:

- Zone of predicted marginal erosion for 50 years (restricted area for new construction);
- Zone of erosive activity including water course's narrow, gullies and ravines flowing into the water body, eroded lands adjacent to the water source, erosion-preventive strip along reservoir, ravines and gullies;
- Zone of temporary land inundation at the highest water level in the water body;
- Zone of permanent and increased groundwater level at the maximum permissible depth:

1 m – for agricultural lands;
2 m – for rural settlements;
3 m – for towns and urban villages;

- An outer border of protective state forestry plantations that locates up to 3 km from inner border of water protection zone of water body;

Clause 16. Minimum width of water protection zone for lakes, ponds and reservoirs is as follows:

Reservoir capacity	**Width of water protection zone (m)**
Up to 10 mln cubic meters	100
Up to 100 mln cubic meters	200
Up to 1 000 mln cubic meters	300
Over 1 000 mln cubic meters	500

Clause 17. As for rivers, the least width of protection zone is determined on both riverbanks of average long-term shoreline for rivers of the following length:

5 to 10 km	Up to 50 m
10 to 50 km	Up to 75 m
50 to 100 km	Up to 100 m
Over 100 km	Up to 150 m

Clause 18. As for main and off-farm canals, the least width of water protection zone is as follows:

Discharge capacity of the canal	
5 to 10 m^3/sec	50 m
10 to 20 m^3/sec	75 m
Over 20 m^3/sec	100 m

Clause 19. Within lands of State Forestry Fund water protection zone includes prohibited forest strips along water bodies allocated in accordance with established procedures. Size of specified prohibited forest strips are based on norms and standards, as provided in "The Guidelines on Assignment Procedures of Forest to Protection Categories" approved by the Resolution of the Council of Ministers of the Kyrgyz SSR dd. 5 November 1982, No. 598.

V. Water Protection Strips

Clause 20. Within water protection zone coastal water protection strips - area of strict restriction of economic activities performance - are allocated in accordance with Clause 10 of the Resolution. Coastal water protection strips shall be covered with meadows and trees and bushes.

Clause 21. Width of coastal water protection strip for lakes, ponds and reservoirs is as follows:

Reservoir capacity	**Width of water protection strip (m)**
Up to 10 mln cubic meters	30
Up to 100 mln cubic meters	50
Up to 1 000 mln cubic meters	70
Over 1 000 mln cubic meters	100

Clause 22. Width of coastal water protection strip of rivers is determined on every riverbank of average long-term shoreline.

Width of water protection strips for main and off-farm canals is determined on both sides of the edge when canal runs in cavity or of the dam's foot when canal runs in embankment.

Size of coastal water protection strips depends on characteristics of the land adjacent to water sources (arable land, hayfield, bushes and etc) and on slope abruptness:

Type of land adjacent to water source	**Width of water protection strip (m) at the following abruptness of adjacent slopes**		
	Adverse and level gradient	Up to 3 degrees	Over 3 degrees
Arable land	10-12	20-35	35-50
Pasture and hayfield	10-15	15-25	25-30
Forest, bushes, garden	20	20-35	35-50

Maximum size refers to the most eroded land.

Clause 23. Within towns, urban villages and rural settlements adjacent to water body only coastal water protection strips are established. Their size is specified based on specific conditions of planning and building in accordance with the General Layout approved by relevant village bodies.

VI. Responsibility and Supervision

Clause 32. Those violating norms of economic activity performance within water protection zones and strips of water bodies shall take responsibility in accordance with the Resolution of the Kyrgyz Republic.

Clause 33. Local state administrations, local government of Bishkek and Osh city and bodies of the State Environment Committee of the Kyrgyz Republic shall supervise establishment and compliance with the norms and procedures of use of the lands within water protection zones and strips.