



1. Project Data

Project ID P120788	Project Name CENTRAL ASIA HYDROMET MODERNIZATION
Country Central Asia	Practice Area(Lead) Urban, Resilience and Land

L/C/TF Number(s) IDA-49340,IDA-62940,IDA-D3520,IDA-D3560,IDA-D3620,IDA-H6770,IDA-H6780,IDA-H6790,TF-99848	Closing Date (Original) 31-Aug-2016	Total Project Cost (USD) 37,334,820.65
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Bank Approval Date 26-May-2011	Closing Date (Actual) 31-Mar-2023
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	IBRD/IDA (USD)	Grants (USD)
Original Commitment	20,700,000.00	7,000,000.00
Revised Commitment	39,099,960.92	7,000,000.00
Actual	37,334,820.65	7,000,000.00

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2. Project Objectives and Components

a. Objectives

According to the Project Appraisal Document (PAD) (p.8) and the Financing Agreement of July 12, 2011 (p. 6) the objective of the project was to “to improve the accuracy and timeliness of hydromet services in Central Asia, with particular focus on Kyrgyz Republic and Republic of Tajikistan”.



For the purpose of the analysis in this ICRR, the PDO will be parsed as follows:

1. To improve the accuracy of hydromet services in Central Asia, with particular focus on Kyrgyz Republic and Republic of Tajikistan; and
2. To improve the timeliness of hydromet services in Central Asia, with particular focus on Kyrgyz Republic and Republic of Tajikistan.

b. Were the project objectives/key associated outcome targets revised during implementation?

No

c. Will a split evaluation be undertaken?

No

d. Components

The project included three components:

Component A: Strengthening regional coordination and information sharing and services (appraisal estimate US\$8.7 million, actual US\$12.2 million): This component was to finance the technical and institutional capacity that will enable the National Hydrometeorological Services (NHMSs) of the participating countries to collect and share more information, analyze it, and collaborate to develop useful products and services for Project beneficiaries.

This component included four sub-components:

Sub-Component A.1 – Improve the technical and organizational capacity of the Executive Committee of the International Fund for Saving the Aral Sea (EC-IFAS) and the Regional Center of Hydrology (RCH): This sub-component was to improve EC-IFAS and RCH's capacity to foster cooperation among NHMS on how information is received, integrated, and exchanged in the region by modernizing hydrometeorological data acquisition.

Sub-Component A.2 – Improve the regional system of training, re-training, and professional development in the field of meteorology, hydrology and climate: This sub-component was to finance staff to utilize the latest forecasting techniques and provide and provide customer and user focused service delivery.

Sub-Component A.3 – Improve the provision of hydrometeorological services by the NHMS: This component was to finance improving early warning systems for extreme events as well as weather and river flow forecasting and climate change assessment systems with access to, and use of, global and regional numerical weather prediction products.

Sub-Component A.4 – Project Management: This sub-component was to support implementation of Component A and ensure full coordination of activities under Components A, B, and C of the project.

In 2016, the scope of the component was revised when Uszhydromet decided to exclude activities related to the procurement of high-resolution satellite data reception system due to lack of funding to support high operating costs and limited technical expertise on the client's side. The freed-up funds were used for



the acquisition of a high-capacity computer for numerical weather prediction, training on modern measuring tools and new technologies and acquisition of equipment for a regional lake research training center.

When the project received AF in 2018 the scope of the component was increased to support modules for landslide/mudflow assessment, riverine routing, and seasonal river forecasting into the existing operational CARFFGS. Also, activities to provide regional support to Turkmenistan were provided since the country decided to join the project. As a result, the cost of component A increased from US\$8.7 million to US\$12.2 million.

Component B: Strengthening of Hydromet Services in Kyrgyz Republic (appraisal estimate US\$6.0 million, actual US\$11.0 million): This component was to strengthen Kyrgyzhydromet so the infrastructure and capacity can sustainably observe, forecast, and deliver weather, water and climate services to meet national economic and social needs.

This component included three sub-components:

Sub-Component B.1 – Strengthen the institutional capacity of Kyrgyzhydromet: This sub-component was to finance: i) providing technical support and training of Kyrgyzhydromet staff; ii) developing and testing of an appropriate business model for the delivery of commercial weather, climate and hydrological services in the Kyrgyz Republic; and iii) revising the scientific methodological basis of the Kyrgyzhydromet operations to World Meteorological Organization standards.

Sub-Component B.2 – Improve the hydrometeorological observation networks to provide timelier extreme and hazardous weather warnings and a more efficient national water resources management system: This sub-component was to finance: i) restoring and improving equipment for hydrological, agrometeorological and snow-avalanche observation; ii) establishing, refurbishing and/or technical enhancing of national centers for meteorological data collection; and iii) developing forecasting systems.

Sub-Component B.3 – Enhance the service delivery system of Kyrgyzhydromet: This sub-component was to finance: i) developing improved services provided by Kyrgyzhydromet including expanded user access to informational products; and ii) providing specialized training to staff involved in service delivery.

Sub-Component B.4 – Project Management: This sub-component was to finance the implementation of country-specific activities of this component and contribute to sustainability of country-based investments.

When the project received AF in 2018, the scope of component B was increased by adding activities on strengthening the national institutional capacities and service delivery in Kyrgyzstan such as a feasibility study for country-wide modernization of hydrometeorological services, monitoring of dangerous high altitude breakthrough lakes, creating a mobile expeditionary subdivision, and modernizing the system for producing weather forecasts on hazardous weather conditions. The cost of the component increased from US\$6.0 million to US\$11.0 million.

Component C: Strengthening of Hydromet Services in Republic of Tajikistan (appraisal estimate US\$13.0 million, actual US\$16.0 million): This component was to modernize the Tajikhydromet to ensure that it has infrastructure and capacity comparable with other countries in the region, to sustainably observe, forecast, and deliver weather, water and climate services that meet national economic and societal needs. This component included four sub-components:



Sub-Component C.1–Strengthen the institutional capacity of Tajikhydromet, including improvement of its human resources and its financial sustainability model: This sub-component was to finance: i) providing technical support and training of Tajikhydromet staff; ii) developing and testing of an appropriate business model for the delivery of commercial weather, climate and hydrological services in the Republic of Tajikistan; and iii) revising the scientific methodological basis of the Tajikhydromet operations to World Meteorological Organization standard.

Sub-Component C.2 – Improve the hydrometeorological observation networks to provide: i) timelier extreme and hazardous weather warnings; and ii) a more efficient national water resources management system: This sub-component was to finance: i) restoring equipment and improving hydrological, agrometeorological, and snow-avalanche observation; ii) establishing, refurbishing and/or technically enhancing of national centers for meteorological data collection; and iii) developing forecasting systems.

Sub-Component C.3 – Enhance the service delivery system of Tajikhydromet: This sub-component was to finance: i) developing improved services provided by Tajikhydromet including expanded user access to informational products; and ii) providing specialized training to staff involved in service delivery.

Sub-Component C.4 – Project Management: The activity was to support the implementation of country specific activities of this component and contribute to sustainability of country-based investments.

The scope of component C was revised when the government of Tajikistan requested to cancel the financing of the high-resolution satellite data reception due to lack of financing to support high operating costs and limited technical expertise at the client's side. The funds that were assigned to these activities were utilized to support activities that were relevant to the development stage of the NHMS such as: i) improving forecasting products; ii) establishing a public weather service; and iii) procuring equipment for printing materials for consumers as well as a remote low resolution monitoring system.

When the project received AF in 2018, the scope of the project was increased to include the following activities: i) upgrading of snow surveying equipment; ii) developing a service delivery strategy and a national framework for climate services; and iii) strengthening publication facilities. As a result, the cost of component C was increased from US\$13.0 million to US\$16.0 million.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project cost: The project was estimated to cost US\$39.2 million. Actual cost was US\$37.3 million.

Financing: The project was to be financed by an IDA credit (IDA-H6790) in the amount of US\$6.0 million (of which US\$5.5 million disbursed), an IDA credit (IDA-H6670) in the amount of US\$8.7 million (of which US\$7.9 million disbursed), an IDA credit (IDA-H6780) in the amount of US\$900,000 (of which US\$871,475 disbursed), an IDA credit (IDA-H49340) in the amount of US\$5.1 million (of which US\$4.7 million disbursed), A Trust Fund in the amount of US\$7.0 million (which completely disbursed), an IDA credit (IDA-D-3620) in the amount of US\$3.0 million (which completely disbursed), an IDA credit (IDA-62940) in the amount of US\$2.5 million (of which US\$2.47 million disbursed), an IDA credit (IDA-D3520) in the amount of US\$2.5 million (of which US\$2.47 million disbursed), and an IDA-credit (IDA-D3560) in the amount of US\$3.5 million (of which US\$3.3 million was disbursed).



Dates: The project was restructured five times:

- On January 28, 2016, the project was restructured to: i) revise PDO and intermediate outcome indicators and add new indicator to better reflect project activities; ii) extend the closing date by 22 months from August 31, 2016 to June 30, 2018 to compensate for delays; and iii) modify project activities and relocate funding to activities most relevant to the current development stage of the National Hydrometeorological Service (NHMS).
- On March 23, 2018, the project was restructured to extend the closing date by six months from June 30, 2018, to December 31, 2018, to keep the project active while the Additional Financing (AF) was being prepared, approved, and signed.
- On July 10, 2018, the project received AF in the amount of US\$11.50 million to allow for the expansion of project scope under components A, B and C and to cover a financing gap due to cost overruns caused by losses due to fluctuations of the exchange rate between US\$ and SDR.
- On December 20, 2019, the project was restructured to extend the closing date from March 31, 2021, for Components A and C (regional and Tajikistan) to March 31, 2023, and Component B (Kyrgyz Republic) to March 31, 2022, due to the delayed effectiveness of the AF.
- On March 11, 2022, the project was restructured to extend the closing date of original and additional financings for Component B from March 31, 2022, to March 31, 2023, (aligning it with the overall project closing date) because of delays related to the COVID-19 pandemic.

3. Relevance of Objectives

Rationale

Country and sector context. The Central Asia (CA) region comprises five former Soviet republics: the Republic of Kazakhstan, Kyrgyz Republic, the Republic of Uzbekistan, Turkmenistan, and the Republic of Tajikistan. According to the PAD (p. 2) since the mid-1980s, the CA National Hydrometeorological Services (NHMSs) capacity had been in decline due to overall spending reductions for public services. Obsolete and broken equipment, poor telecommunications, inadequate training, and problems retaining qualified staff resulted in the NHMSs from providing adequate weather, water, and climate services. Lack of access to timely and accurate weather, climate, and water information impeded civil society and economic performance. For example, almost 50 percent of Kyrgyz Gross Domestic Product (GDP) was weather dependent and urgently required upgrades to the currently inadequate hydrometeorological and climate information to plan daily and seasonal operations. Also, Tajikistan was prone to natural disasters and severe weather incidents, the population depended on rain-fed agriculture for food, and the national economy depended on irrigated agriculture for exports. Strengthening the capacity of Tajikhydromet to deliver weather, water, and climate services was vital to Tajikistan and important for the region. Other CA countries were also vulnerable to weather, climate, and water-related hazards.

Given the cross-border nature of the weather, it was critical for the countries that a coherent regional approach to developing hydromet services was to be adopted. This regional approach required coherence especially on three levels: i) data collection; ii) data sharing, modelling, and analysis, and iii) delivery of products and services to users and decision-makers. While the project focused to improve the accuracy



and timeliness of hydromet services in CA countries, it focused on two countries in particular, Tajikistan and the Kyrgyz Republic, to level their hydromet capacities up with the other CA countries.

Alignment with the government strategy. The objective of the project was in line with Kyrgyz Republic National Development Strategy (2018-2040) which aims to strengthen hydromet services and environmental monitoring. The strategy identifies the importance of reliable data to improve environmental performance to reasonably formulate and implement development plans as well as to use data to make inform decisions that are environmentally sound. The objective was also in line with Tajikistan’s National Development Strategy until 2030 which aims to build national institutional capacity for natural disasters forecasting, preparedness, and mitigation.

Alignment with the World Bank strategy. In September 2008, international, regional, and national partners joined the World Bank to initiate work on a regional hydromet-strengthening program, endorsed by the Central Asia Regional Economic Cooperation Program (CAREC) countries. The objective of the project was in line with CAREC 2030 Strategy with emphasizes the importance of a coordinated regional approach for developing and improving early warning systems for climate-linked disasters given CA’s vulnerabilities.

Also, the objective of the project was in line with the Bank’s most recent Country Partnership Framework (CPF) (FY19-22) for the Kyrgyz Republic, which, under objective 9, emphasizes the importance of enhancing the country’s resilience to climate change and disaster risks. Furthermore, the objective of the project was in line with the Bank’s CPF (FY19-23) for Tajikistan and one of its focus areas where it stresses the importance of improving the resilience of residents in local communities.

The objective of the project was pitched at an appropriate level to address a critical development problem.

Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To improve the accuracy of hydromet services in Central Asia, with particular focus on Kyrgyz Republic and Republic of Tajikistan

Rationale

Theory of Change: The project’s activities/inputs such as establishing data collection centers and a calibration laboratory, purchasing new ICT equipment as well as equipment for historical data archiving were to result in several outputs. These outputs were to include data collection centers and a calibration laboratory being established, new ICT and historical data archiving equipment being purchased. These outputs were to



result in the outcome of improved accuracy of hydromet services in Central Asia, especially in Kyrgyz Republic and Republic of Tajikistan.

The theory of change was sound and logical.

Outputs:

The following outputs were included in the Results Framework and included targets:

- Kyrgyz Republic:
 - The status of hydrometeorological observation networks were improved from 13 percent of meteorological stations gauging main meteorological parameters in 2011 to 100 percent of meteorological stations gauging main meteorological parameters in 2023, **achieving the target of 100 percent.**
 - While in 2011, 44 percent of stream gauges reported operational data, 68 percent of stream gauges reported operational data in 2023, **not achieving the original target of 95 percent and the revised target of 93 percent.**
 - While in 2011, 77 percent stream gauges measured discharges, this increased to 87 percent in 2023, **achieving the target of 87 percent.**
- Republic of Tajikistan:
 - The status of hydrometeorological observation networks were improved from 19 percent meteorological stations gauging main meteorological parameters to 90 percent, **achieving the target of 90 percent.**
 - The percentage of stream gauges reporting operational data increased from 16 percent in 2011 to 43 percent in 2023, **not achieving the target of 50 percent.**
 - While in 2011, 49 percent of stream gauges measured discharges, this increased to 58 percent in 2023, **not achieving the original target of 90 percent or the revised target of 71 percent.**
 - In 2011, the information on climate was limited and of inadequate quality. This improved to the country being able to downscale local scales for at least 85 percent of the country, **close to achieving the target of 90 percent.**

The ICR reported on following additional outputs that were not included in the Results Framework and hence lacked target values:

- 35 meteorological stations and 10 hydrological stations were rehabilitated and automated in the Kyrgyz Republic.
- 54 meteorological stations and 16 hydrological stations were rehabilitated and automated and 42 hydrological posts were rehabilitated in the Republic of Tajikistan.
- A Calibration laboratory with standard and verification equipment, providing calibration of the main types of hydrometeorological measuring instruments were installed in Tajikhydromet and Kyrgyzhydromet.
- An Observation Data Collection Center (OSDN) was introduced and was operational to provide reception of hydrometeorological information from the Automated Observation Networks in the Kyrgyz Republic and Republic of Tajikistan.
- A high-speed computer cluster was installed at Kyrgyzhydromet and Tajikhydromet to produce weather forecasting.



Outcomes:

- In the Kyrgyz Republic, the forecasting accuracy improved from 76 percent in 2011 to 93 percent in 2023, **exceeding the target of 85 percent**. The accuracy was assessed as the accuracy rate of the 72-hour forecast and measured by aggregating minimum and maximum temperatures and precipitation.
- In the Republic of Tajikistan, the forecasting accuracy improved from 66 percent in 2011 to 84 percent in 2023, **close to achieving the target of 85 percent**.
- In the Kyrgyz Republic, the river-flow forecasting improved from 62 percent in 2016 to 90 percent in 2023, **exceeding the target of 85 percent**.
- In the Republic of Tajikistan, the river-flow forecasting improved from 64 percent in 2016 to 80 percent in 2023, **achieving the target of 80 percent**.
- The project supported the implementation of the method for Severe Weather Forecasting Demonstration project cascading forecasting process for the CA NHMSs by providing the required licenses for the software and maintenance of COSMO technology for Uzhydromet, Kyrgyzhydromet and Tajikhydromet. Within the framework of the regional cascading method, numerical products generated by a regional center based in Uzhydromet (Consortium for Small-Scale Modelling Central Asia - COSMO-CA) served as inputs for national models. As a result of processing information from global and regional sources, COSMO-CA produced a more specific regional forecast with a resolution of 6 kilometers and a national forecast with a resolution of 2.2 kilometers, which was a substantial improvement from the baseline of 100x250 kilometers transmitted every 12 hours. The target of 7x7 kilometers every six hours for all of Central Asia and 2x2 kilometers every six hours for the mountainous region of Central Asia was **exceeded**.

Given the project's investments stated above, the project was able to Substantially improve the accuracy of hydromet services in Central Asia, especially in the Kyrgyz Republic and the Republic of Tajikistan. Overall, the achievement of this objective was **Substantial**.

Rating

Substantial

OBJECTIVE 2

Objective

To improve the timeliness of hydromet services in Central Asia, with particular focus on Kyrgyz Republic and Republic of Tajikistan

Rationale

Theory of Change: The project's theory of change stated that project activities/inputs such as modernizing observation networks in the Kyrgyz Republic and the Republic of Tajikistan as well as strengthening the institutional capacity of the hydromet agencies of these countries were to result in several outputs. These outputs were to include automated meteorological and hydrometeorological stations being modernized and current stations being upgraded, as well as the business models with new operational guidelines of the hydromet agencies in the Kyrgyz Republic and the Republic of Tajikistan being developed. Also, a feasibility study on country-wide modernization of hydrometeorological services was to be produced and delivered to



Kyrgyzhydromet. These outputs were to result in the improvement of the timeliness of hydromet services in Central Asia, with particular focus on Kyrgyz Republic and Republic of Tajikistan.

The theory of change was sound and logical.

Outputs

- The Central Asia Flood Early Warning System (CAFEWS) was established to provide flash flood, landslide, riverine routing and snowmelt guidance products across the region, **achieving the target** of such products being provided.
- In the Kyrgyz Republic, 1.2 million pages of historical data were scanned, **exceeding the target of 800,000 pages**.
- In the Republic of Tajikistan, 1.4 million pages of historical data were archived, **exceeding the target of 800,000 pages**.
- The percentage of data transmitted to the global telecommunication system increased from 70 percent in 2011 to 98 percent in 2023, **close to achieving the target of 100 percent**.

The ICR and the client reported on the following additional outputs that were not included in the Results Framework and hence did not have any target values:

- The Central Asia Flood Early Warning System (CAFEWS) was established.
- Database management systems for meteorological, climate and hydrological data (MCH) and dynamic water assessment tool (DWAT) was implemented in Central Asia National Hydrometeorological Services (NHMSs).
- A media studio to broadcast weather forecasts was set up in Tajikhydromet.
- A chat bot to communicate with users in Kyrgyzhydromet was set up and put into operation.
- A hydrometeorological database was created in Kyrgyzhydromet and Tajikhydromet.
- The glaciology center in the Republic of Tajikistan was supplied with field work and winter expedition as well as office equipment.
- The avalanche monitoring system in Kyrgyzhydromet was modernized and equipment for monitoring avalanches was purchased.
- 300 specialists of Tajikhydromet and Kyrgyzhydromet were trained in meteorological, agrometeorological, hydrological, glaciological, avalanche and marketing aspects.
- At the regional level, there has been a renewal of the license for five Central Asian countries to access the web products from the European Centre for Medium-Range Weather Forecasts (ECMWF).
- Throughout the project, 60 regional learning events were successfully conducted, including workshops, study tours, and online seminars, with 778 participants from the 5 Central Asian NHMS.

Outcomes:

- In the Kyrgyz Republic, the user satisfaction regarding timeliness increased from a score of 2.80 in 2016 to a score of 3.7 in 2020, **not achieving the target of 4.3**. The scores were based on a 1-5 scale with 5 indicating the highest possible level of user satisfaction. The total score was calculated based on a multi-user surveys and interviews which consolidated responses to several questions about accuracy, quality, timeliness, breadth, understandability, and demand for additional hydromet services. According to the ICR (para. 42) even though the second survey was done in 2020 before the



project was completed, most investments in modernizing infrastructure had already been implemented.

- In the Republic of Tajikistan, the user satisfaction regarding timeliness increased from a score of 2.9 in 2016 to a score of 3.5 in 2023, **not achieving the target of 4.3**.

There were shortcomings in the improvement of users' satisfaction with hydrometeorological services in the Kyrgyz Republic and the Republic of Tajikistan. The project was, however, able to achieve the target for the accuracy and timeliness of basic weather forecasts in for Kyrgyzhydromet but not for Tajikhydromet.

Outputs and outcomes that were relevant to both objectives:

Outputs:

- The access to national and regional numeric weather prediction products to all CA countries improved from 100x250 kilometers transmitted every 12 hours in 2016 to 6.6x6.6 kilometer forecasts every 12 hours for all of Central Asia. Therefore, the original target of 13x13 km every six hours and the revised target of 7x7 kilometers every six hours for all of Central Asia and 2x2 kilometers every six hours for the mountainous region of Central Asia was only **partially achieved**.
- Kyrgyz Republic: New technical instructions and standard technical operating procedures were developed and implemented for Kyrgyzhydromet. Also, Kyrgyzhydromet's budget was increased (the ICR did not state the size of the increase), and a feasibility study and business plan were developed and will be in place until 2030. The target of developing new regulations, standard operating procedures and a business plan as well as significantly increasing the budget were achieved. However, the Results Framework did not provide a definition for "significantly increasing", making an assessment of that part of the target challenging.
- Republic of Tajikistan: New regulations were developed and approved, the budget was increased and a user survey as well as a long-term business plan was developed for Tajikhydromet. Therefore, the target of developing new regulations, standard operating procedures and a business plan as well as significantly increasing the budget were achieved. However, the Results Framework did not provide a definition for "significantly increasing", making an assessment of that part of the target challenging.
- A Distance Learning System (DLS) was established with branches in Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. A cascade method of severe weather forecasting (SWFDP-CA) in Central Asia was developed and implemented. The target of adopting a regional approach in hydromet forecasting and formalizing a decision-making mechanism for regional issues among four NHMSs in Central Asia was achieved.

Outcomes:

- The accuracy and timeliness of basic weather forecasts (measured as percentage of weather forecasts of 72 hours lead time) increased from 65 percent in 2011 to 84 percent in 2023 for Tajikhydromet, **close to achieving the target of 85 percent**.
- The accuracy and timeliness of basic weather forecasts increased from 60 percent in 2011 to 93 percent in 2023 for Kyrgyzhydromet, **exceeding the target of 85 percent**.

Rating



Substantial

OVERALL EFFICACY

Rationale

The project substantially improved the accuracy of hydromet services in Central Asia, especially in the Kyrgyz Republic and the Republic of Tajikistan and it improved users' satisfaction with hydrometeorological services in the Kyrgyz Republic and the Republic of Tajikistan. It furthermore achieved the target for the accuracy and timeliness of basic weather forecasts in for Kyrgyzhydromet but not fully for Tajikhydromet. The overall efficacy rating is Substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic efficiency:

Both the PAD and the ICR included a cost-benefit analysis. The PAD (p. 21) assessed the efficiency by comparing the estimated economic losses potentially prevented as a result of project implementation with the cost of this prevention. The benefits of the two national components were assessed while the costs for the whole project were considered. Applying a discount rate of 12 percent, the PAD calculated an Economic Internal Rate of Return (EIRR) of 22.13 percent, a Net Present Value (NPV) of US\$8.31 million and a benefit-cost ratio of 1.39.

The ICR (p. 12) conducted a similar cost-benefit analysis (also applying a discount rate of 12 percent) which resulted in an EIRR of 47 percent, an NPV of US\$107.9 million, and a benefit-cost ration of 2.0, indicating that the project was a worthwhile investment. According to the Bank team (December 19,2023) the results at the ICR stage were significantly higher since the analysis at appraisal considered a short time frame of 10 years (five years of implementation and five years of operation/benefit flow). The actual implementation period was over nearly 12 years. Also, the analysis assumed that the project lifespan and its impact accounted for 22 years. In addition, the PAD assumed an annual GDP growth for Kyrgyzstan of 4.7 percent, when the actual annual growth between 2010 and 2022 was 6 percent.

Operational efficiency:

The project's implementation period was extended five times by a total of six years and seven months. The project's first extension in 2016, was a result of delays due to several reasons: i) project preparation was completed within a very short period of time, and therefore key aspects of detailed design and planning of investments were deferred to the implementation stage; ii) significant delay on the part of the Systems Integrator to mobilize staff on the ground and prepare bidding documents for the major procurement packages. This prevented the project from making key decisions on operational approaches, selection of technology and



equipment, and identification of required additional human resources and capacity; and iii) contracts for modernization of the observation network (automatic equipment) were signed with a delay by both Kyrgyzhydromet and Tajikhydromet and required a minimum one and half year to be implemented and yield initial results. Also, the national elections in the Kyrgyz Republic in 2020 resulted in changes in leadership of all key departments and resulted in a temporary disruption in making decisions which required an extension of the closing date. Furthermore, according to the ICR (para. 88) as a result of slow approvals of specifications, Terms of References, and evaluation reports by Kyrgyzhydromet and Tajikhydromet, the project experienced additional delays.

Overall, the efficiency of the project is rated Substantial.

Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	22.13	68.60 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	47.00	68.90 <input type="checkbox"/> Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

Relevance of the objective was High given its alignment with Bank’s most recent Country Partnership Framework (CPF) (FY19-22) for the Kyrgyz Republic and Bank’s CPF (FY19-23) for Tajikistan. Efficacy and Efficiency were Substantial. The overall outcome rating is Satisfactory.

a. **Outcome Rating**
Satisfactory

7. Risk to Development Outcome

The project’s risk to development outcome can be classified into the following categories:

Government commitment: According to the ICR (para. 99) the governments of the Kyrgyz Republic and the Republic of Tajikistan have expressed their continuous commitment to the development objective as



demonstrated through the substantial increase in budget as well as in staff salaries of Kyrgyzhydromet and Tajikhydromet during project implementation.

Technical capacity: The ICR (para. 99) stated that despite staff salary increases in of Kyrgyzhydromet and Tajikhydromet, staff turnover remains a challenge. In order to ensure the sustainability of project outcomes of the project, retaining qualified staff trained under the project will be critical. The ICR suggested to offer staff career opportunities, training, and ensure knowledge transfer between new and more experienced staff.

Sustainability: Furthermore, the ICR (para. 97) stated that maintenance efforts might be hindered due to the lack of sensor calibration arrangements. Discussions have been ongoing, based on costs and ability to support the specific reference sensor owned by Tajikhydromet, that a calibration center in Turkey would be a good option for a long-term service agreement. However, discussions are still ongoing, and no decision has been made. Also, Kyrgyzhydromet was in the process of obtaining International Standard Organization (ISO) accreditation for its sensor calibration laboratory and as a result limiting its ability to independently verify equipment within their own laboratory. This might result in longer wait times for maintenance, repairs, and calibration of purchased measuring instruments.

8. Assessment of Bank Performance

a. Quality-at-Entry

According to the PAD (p. 15) the project was built on previous regional projects, global expertise in the hydromet sector as well as a Bank report that focused on improving hydrological services delivery in CA. Key lessons learned included: i) design programs for the regional level but divide projects and activities into efforts at the national level; ii) regional projects engage regional sector institutions and national institutions in each participating country so implementation arrangements must be as clear as possible; and iii) anchoring compliance across countries with protocols and project agreements in separate legal agreements can be challenging.

The PAD (p. 19) identified relevant implementation risks such as regional cooperation activities, political differences, and limited institutional capacity. Also, the PAD stated that stakeholder commitment might be weaker than originally stated. Mitigation measures included the signing of a Memorandum of Understanding that established government and donor community support of hydromet cooperation, including specific areas of cooperation. Also, the Bank was to work closely with the hydromet services of both countries and the EC-IFAS and its RCH to strengthen their capacity.

Not all mitigation measures were sufficient, resulting in implementation delays. The Bank did not identify the risk of the Uzhydromet decision in 2016 to exclude activities related to the procurement of high-resolution satellite data reception systems from the project's scope due to a lack of funding to support high operating costs and limited technical expertise on the client. Also, in 2014, the government of Tajikistan asked to exclude the financing of high-resolution data reception due to a lack of funding to support high operating costs and limited technical expertise.

There were shortcomings in implementation readiness. The project was prepared within six months only. This meant that some aspects of project design had to be addressed during implementation which resulted in delays of the initial start of implementation of activities. The ICR also notes significant delays



on the part of the Systems Integrator to mobilize staff on the ground and prepare bidding documents for the major procurement package.

There were also some shortcomings in the Results Framework (refer section 9a).

Quality-at-Entry Rating

Moderately Satisfactory

b. Quality of supervision

According to the ICR (para. 91) the Bank team conducted regular supervision missions on a bi-annual basis. During the COVID-19 pandemic, the Bank team conducted virtual missions, allowing implementation to move forward. The project also benefitted from the Bank's team continuity with only one change in Task Team Leader (TTL) throughout implementation as well as support from local Bank staff.

The Bank team restructured the project five times and adjusted implementation when necessary. When the project experienced procurement related challenges, the Bank team to address them by encouraging the government to hire a qualified firm that played the role of a system integrator (see section 10b for more details). Furthermore, according to the ICR (para. 76) the Bank team was able to obtain various grants for Technical Assistance to provide support to the implementing entities.

Quality of Supervision Rating

Satisfactory

Overall Bank Performance Rating

Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The project's objective was clearly specified, and the theory of change and how key activities and outputs were to lead to the intended outcomes were sound and reflected in the Results Framework. The selected PDO indicators encompassed all outcomes of the objective. Also, the intermediate outcome indicators were adequate for measuring the project's contribution towards achieving the objective. All indicators had a target and baseline and were measurable and sufficiently specific. Having separate indicators for measuring the accuracy and timeliness aspects of the PDO at the design stage would have been useful. Subsequently, an indicator was added during implementation by introducing a PDO indicator to measure user satisfaction with hydromet services, including their timeliness. The intermediate results indicator "increased institutional strength and sustainability of Kyrgyzhydromet" would have benefitted from defining the target "budget significantly increased". Furthermore, the project delivered a large number of outputs



that were not measured in the Results Framework, making an assessment of planned versus actual achievement challenging.

According to the PAD (p. 18) countries were responsible for national data collection. The Executive Committee of the International Fund for Saving the Aral Sea (EC-IFAS) was to be responsible for regional monitoring.

b. M&E Implementation

According to the ICR (para. 82) the PCU, PMU and PIU collected data from the hydromet agencies and provided reports on implementation progress on a regular basis. This allowed the implementing agencies and the Bank to assess implementation progress and make adjustments, if necessary.

The Bank team restructured the Results Framework twice to modify PDO and intermediate outcome indicators as well as drop and add new indicators to better reflect project activities and adjust targets when the project received AF. The project developed a user satisfaction methodology and conducted two surveys in Tajikistan and the Kyrgyz Republic to compare the satisfaction level before and after project investments.

According to the Bank team (December 19, 2023) the data was found to be reliable and of good quality. M&E functions and processes are expected to be continued and build on.

c. M&E Utilization

According to the ICR (para. 83) the project's M&E data were used to inform decision making. For example, M&E data informed the decision to extend the project closing date five times. Also, the project helped to strengthen the M&E system of the Hydromet services, and, by using M&E data from the Hydromet service, decision-makers can make informed decisions on disaster preparedness, water resource management, and the energy sector, leading to improved resilience and sustainable development.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

The project was classified as category c and did not trigger any of the Bank's safeguard policies.

b. Fiduciary Compliance



Financial Management:

According to the ICR (para. 87) the project had adequate financial management (FM) arrangements in place, followed the Bank’s financial management covenants, submitted timely and accurate quarterly reports to the Bank and submitted project and entity audit reports in a timely and satisfactory manner. Also, the external auditor’s opinions were unqualified. FM was continuously rated Satisfactory throughout project implementation.

Procurement:

According to the ICR (para. 88) the project encountered several procurement challenges related to obtaining internal approvals for the technical specifications, bidding documents, bid evaluation reports and contract signing. As a result of slow approvals of specifications, Terms of References, and evaluation reports by Kyrgyzhydromet and Tajikhydromet, the project experienced delays. Several contracts also required rebidding due to: i) noncompliance of bids and bidders with requirements of bidding documents; ii) challenges to deliver equipment in the required time; and iii) prices being higher than the planned budget. These challenges resulted in the project’ procurement performance fluctuating between Moderately Unsatisfactory to Moderately Satisfactory throughout project implementation. According to the Bank team (December 19, 2023) the Bank team addressed these issues by encouraging the government to hire a qualified firm that played the role of a system integrator to ensure close coordination and technical support at the regional and country levels, and worked closely with Tajikhydromet and Kyrgyzhydromet, and RCH to facilitate design, implementation, and supervision activities of all three components, including support to associated procurement processes, as well as to ensuring all procurements were aligned and compatible to deliver holistic systems and capacity.

The ICR (para. 88) stated that the Bank team worked with the PCUs to develop a timeframe for decision making processes within the implementing agencies resulting in improvements.

When the project closed, the procurement rating was Moderately Satisfactory.

c. Unintended impacts (Positive or Negative)

NA

d. Other

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Satisfactory	
Bank Performance	Satisfactory	Moderately Satisfactory	Shortcomings in the Quality at entry regarding implementation



			readiness and risk mitigation measures
Quality of M&E	Substantial	Substantial	
Quality of ICR	---	Substantial	

12. Lessons

The ICR (p. 21-22) provided several lessons learned which were adapted by IEG:

- **If capacity building does not go hand-in-hand with modernization efforts, this may jeopardize the sustainability of project outcomes.** This project created an enabling environment for modernization in the Republic of Tajikistan and Kyrgyz Republic by ensuring that the agencies had the capacity to absorb and operate the new tools and equipment. The project developed Development Business Plans, increased the operating budget, and trained the staff of the entities to build institutional, technical, and management capacity.
- **User satisfaction surveys can be useful tools to understand the user needs and drive service development but has limitations.** In this project, a user satisfaction survey was conducted to assess the quality of weather forecasts. The data collected provided deeper insights into user requirements and preferences and will allow to improve services accordingly. However, user satisfaction surveys can only provide information about the users' perception and is not sufficient to measure the actual quality of services (like the quality of the weather forecasts). Independent/unbiased indicators would be needed to allow to measure the actual quality.
- **Combining local knowledge with international expertise from development partners and host government leadership allows for the achievement of sustainable project outcomes.** In this project, a wide range of development partners including the World Bank, the World Meteorological Organization (WMO) and the Global Facility for Disaster Reduction and Recovery (GFDRR) provided specialized knowledge that complemented the hydromet agencies understanding of the local context.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR provided an adequate overview of project preparation and implementation, was concise and internally consistent. Also, the ICR included an appropriate Economic analysis and useful lessons learned that can be applied to future projects in this area. Furthermore, the ICR was sufficiently outcome driven but would have benefitted from providing targets for the large number of outputs produced under this project. Overall, the quality of the ICR is rated Substantial.



a. Quality of ICR Rating
Substantial