PROJECT INFORMATION DOCUMENT (PID)
CONCEPT STAGE

Report No.: PIDC12697

Project Name	Syr Darya Control and Northern Aral Sea Project, Phase 2 (P152001)
Region	EUROPE AND CENTRAL ASIA
Country	Kazakhstan
Sector(s)	Animal production (30%), Flood protection (30%), General water, sanitation and flood protection sector (40%)
Theme(s)	Infrastructure services for private sector development (14%), Rural services and infrastructure (29%), Water resource management (29 %), Other environment and natural resources management (28%)
Lending Instrument	Investment Project Financing
Project ID	P152001
Borrower(s)	Ministry of Finance
Implementing Agency	Ministry of Agriculture, Committee for Water Resources
Environmental Category	B-Partial Assessment
Date PID Prepared/ Updated	24-Sep-2014
Date PID Approved/ Disclosed	24-Sep-2014
Estimated Date of Appraisal Completion	22-Dec-2014
Estimated Date of Board Approval	22-Dec-2014
Concept Review Decision	Track II - The review did authorize the preparation to continue

I. Introduction and Context

Country Context

Over the past decade, Kazakhstan has built a record of strong macroeconomic management and a rules-driven policy and fiscal framework. However, Kazakhstan was affected by the global economic crisis. Kazakhstan has also become a key destination for labor migrants. Among these are a large number who migrate to escape the environmental devastation and resulting economic collapse in the Aral Sea region. In addition to international migrants, many environmental migrants are also relocating within Kazakhstan away from affected areas.

These challenges encouraged the Government to emphasize growth from non-oil sources in its development strategy, "Kazakhstan's Way to 2050: Common Goal, Common Interests, Common Future". The strategy aims to join the 30 most developed countries of the world, and is based on

economic diversification, innovation, investment in human capital and international trade integration. Toward these goals the strategy seeks to improve governance, quality of public services, and the business climate.

Sectoral and Institutional Context

<Syr Darya river and the transboundary context>

The Syr Darya river rises in two catchments in Tian Shan mountains in Kyrgyzstan and eastern Uzbekistan, the Naryn River and the Kara Darya, which converge in the Uzbek part of the Fergana Valley, then flows for some 2,212 kilometres west and north-west through Uzbekistan and southern Kazakhstan to the remains of the Aral Sea. The Syr Darya drains a catchment area of over 800,000 square kilometers, but no more than 200,000 square kilometers actually contribute significant flow to the river. Its mean annual flow is around half that of its sister river, the Amu Darya: typically 35-40 Billion m3/year at Toktogul dam in Kyrgystan, 15-20 Billion m3/year at Chardera dam in Kazakhstan (Chardera reservoir is shared with Uzbekistan, with total storage of 5 Billion m3), then dwindling to as small as 3-4 Billion m3/year at the Aral Sea.

The effect of upstream transboundary problems of the past and present have accumulated in this downriver part of the Syr Darya basin. The harnessing of the water resources of the Tien-Chan mountain range during Soviet times has altered the natural water flow by great storage schemes designed for irrigation in the Uzbek and Kazakh lowlands. Under natural conditions the Syr Darya is a summer flood river fed by the melting of mountain snow and glaciers in summertime. This has shaped Syr Darya river flood plain, lakes and the size of the Aral Sea. Along its course, the Syr Darya irrigates the most productive agricultural region in Central Asia, together with supplying several towns with water. Massive expansion of irrigation canals in middle and lower Syr Darya during the Soviet period to water cotton and rice fields caused ecological damage to the area. The amount of water withdrawn was such that in some periods of the year, no water at all reaches the Aral Sea, similar to the Amu Darya in Uzbekistan and Turkmenistan. The considerable storage and diversion of the water for irrigation in Soviet times has thus led to the ecologically and economically disastrous drying up of the Aral Sea.

After independence, with the institutional breakdown in river basin management, Kyrgyzstan, the upstream state controlling Toktogul, the largest reservoir in the Syr Darya river basin, has opted for a hydropower regime, because of lack of other energy resources. Kyrgyzstan's hydropower is required most in winter, thus great water masses are released downstream during a time when they are not needed for irrigation, which peaks in summer.

Starting 1992, the Interstate Commission for Water Coordination of Central Asia (ICWC) developed a common strategy for transboundary water management for the Aral Sea Basin, determining water allocations and reservoir operations in the Amu Darya and Syr Darya river basins. Declarations on water sharing were signed in 1995 (Nukus) and in 1997 (Almaty). In March 1998, a long-term water and energy agreement was signed between the three riparian countries, Kazakhstan, Uzbekistan and Kyrgyzstan, vis-à-vis sharing hydro-power benefits from Kyrgyzstan. In August 2007 on the Shanghai Cooperation Organization (SCO) summit the heads of several of the SCO member-states have proposed a new policy of utilization of hydroelectric energy resources. In this frame a new agreement on utilization of transboundary water resources is considered.

An International Fund for the Aral Sea (IFAS) was established in 1993 and an Interstate Council was created to coordinate and manage financial resources and programs in the field of ecological and socio-economic development in the Aral Sea Region. In the Ashgabat declaration of April 1999, the five Heads of State expressed once more their concern on the quality of life in the Aral Sea region. They acknowledged the need for an integrated and joint regional strategy based on an ecosystem approach and integrated water management.

Complex allocation tradeoffs still exist in the Syr Darya basin. The energy-poor yet water-rich upstream countries (Kyrgyzstan and Tajikistan) use water for hydropower production in the winter. Conversely, the downstream states (Uzbekistan, Turkmenistan and Kazakhstan) consumptively utilize water in the summer irrigation season. Around 22 million people depend on irrigated agriculture for their livelihoods there, and 20 to 40% of the economic output of these countries is derived from agriculture, most of which is irrigated. The extensive development of irrig ation since the 1950s is associated with severe environmental problems, most notably the desiccation of the Aral Sea, which has lost up to 90 percent of its pre-1960 volume.

All these challenges are further aggravated by an aging infrastructure in the basin and its management is increasingly compromised by the fact that the monitoring capacity of crucial environmental variables is declining. The irrigation and drainage infrastructure has fallen into disrepair in many parts of the basin, increasing soil salinity and water logging and dampening agricultural yields.

The Kazakh part of the Syr Darya river basin (lower Syr Darya) is thus the lowest part of a very complex natural and man-made system.

<The national context>

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Despite the aforementioned transboundary agreements, Kazakhstan faces river-basin management challenges related to both water quantity and quality.

- Water quantity: The Toktogul reservoir is operated in a hydropower regime, thus potentially limiting the optimum river basin management in respect to irrigation delivery and winter flood prevention. Also Uzbekistan has built small diversion dikes upstream of Chardera which restrict some of the Syr Darya flow that previously could flow at flooding times to the Arnasai-Aydarkul depression (the initial potential spillage in the depression was 2160 m3/sec, currently reduced to as low as 600 m3/sec). These developments contributed to limiting the flood retention capacity of Chardera reservoir to around a 1:500 year flood (maximum 1:1000, TBC). Due to the lack of downstream reservoir capacity and icing up of the river in winter, winter flooding became more recurrent. Flooding impacts significant numbers of people and livelihoods along the Kazakh part of the Syr Darya and its tributaries. Two main types of flooding have to be distinguished. First, hazards exist from snow-melt induced events due to the sudden onset of spring. Second, river channel capacities are reduced in winter due to ice formation. High winter flows spill over the river banks and the breaking of ice dams can impact vast areas. In addition, less river water can be retained for the ecosystems and for irrigation in summer. The latter problem is compounded by a significant unaccounted for flow diversions in Syr Darya mid-stream during the summer irrigation season.

- Water quality: The insufficient water quantity translates into a water quality issue, as most of the

country's riparian territory is part of various internal drainage basins, none of which have an outflow to the sea. Hence pollutants are not flushed out regularly but rather accumulate internally on the weakly drainable low-land territory. Part of the problem originates from mid-stream agricultural activities as large amounts of agricultural discharge are drained back into the river. As the restricted lower Syr Darya flow receives increased effluent loads, the concentration of some water-pollutant parameters has been rising. Total dissolved solids have increased from 0.5 – 0.6 g/l in the 1960s to 1 g/l today. As a result, soil degradation is increasingly becoming an issue in the irrigated parts of the country. The consequence includes loss of soil fertility, water logging, increased salinity and herbicide and pesticide concentrations in aquifers which are mostly used for domestic water supply. The combination of these impacts contributes to undermine local livelihoods, poses negative health impacts, and incentivizes farmers to exploit land and water resources mostly for short-term gains.

<Climate change posing potentially additional issues>

Climate Change is expected to affect the timing of the discharge from snow- and glacier-melt, shifting from the current spring/early summer regime towards a late winter/early spring runoff regime. This would have important implications for reservoir management as runoff from unregulated tributaries might decline during the irrigation season in the downstream. Furthermore, retreating glaciers can increase potential hazards from glacial lake outbursts.

<Recent Government investments and programs>

The limited internal capacity along the lower Syr Darya in Kazakhstan to store flows intermittently for flood control and/or offsetting demand and supply imbalances, entailed that Kazakhstan invests in increasing this river storage/conveyance capacity, while also maintaining a dialogue with the upper riparians (e.g. Uzbekistan on the Arnasay depression and Kyrgystan on the Toktogul operation).

To address the demand-supply seasonal imbalances in lower Syr Darya and degradation of the Aral Sea and its delta lakes, the Government prepared a long-term program including: modifications in the Chardera dam to address reduced spills to Uzbekistan's Arnasay depression; rehabilitation of weirs and replacement of pontoon bridges with high-level bridges in order to increase the carrying capacity of the river; rehabilitation of irrigation and drainage infrastructure; flood protection measures; improvement of hydraulic infrastructure in the Delta; and complementary measures which will be beneficial to the riparian communities and the environment. Of this program, the World Bank supported a project, Syr Darya Control and Northern Aral Sea (SYNAS) Phase I (US $85 million, 2001-2010), which implemented a targeted subset of this program along the Syr Darya river, notably by building an earthen dike, the Kok-Aral dike, to restore the Northern Aral Sea (NAS).

The SYNAS project met its targets. It increased NAS volume by 68% (as Kok-Aral Dike raised NAS from 38m to 42m BSL), reduced its salinity by 50%, increased fish production/year by more than 3 times, reduced the distance from NAS to Aralsk city from 75Km to around 20Km, improved flora and fauna and public health, contributed to doubling the number of residential houses in project adjacent areas, improved the safety of Chardera dam, and reduced water losses along lower Syr Darya from 5 BCM/year to below 1 BCM/year.

Also recently Kazakhstan built the Koksaray balancing reservoir downstream Chardera dam, with

storage capacity of 2.2 Billion m3, which, if operated conjunctively with Chardera, can provide some flood mitigation. The Koksaray depression can store excess winter flow that can be used later for irrigation and for maintaining the environmental flows (albeit the evaporation losses in Koksaray can be as high as 0.4 BCM/year). The Koksaray reservoir would be adequate in storing Toktogul's excess winter releases if these releases were to continue in the same pattern as they have over the past years. Such in-country additional storage options thus warrant to be complemented by agreeing with the riparians on the sustainable operation of the hydraulic structures along the Syr Darya.

Building on the SYNAS outcomes, the Government requested Bank's support to prepare a second phase, SYNAS2, to scale up the same line of SYNAS interventions, as part of the Government's fulfillment of the overall Syr Darya program. The SYNAS2 project is envisaged to be the first stage of a two-stage investment program; the second stage being SYNAS3 which would focus mainly on continuing the North Aral Sea (NAS) restoration, possibly (TBD) in addition to building an additional emergency spillway at Chardera dam.

The SYNAS2 interventions would help in mitigating floods and increasing the conveyance capacity along lower Syr Darya, which could also help in taping the inter/intra seasonal storage capacity of water bodies such as the Koksaray and the NAS. For instance, as SYNAS2 would support flood mitigation investments along Syr Darya, this would complement Koksaray's function; if Koksaray happens to be empty at the start of a potentially dangerous flood in the basin, it can act as a buffer and thus mitigate flood impacts; whereas if Koksaray can be filled more sufficiently at the beginning of the irrigation season, it can help improve the diversions for irrigation as well as for the ecosystems throughout the season, both in adequate quantity and permissible quality.

Also as part of managing the lower Syr Darya basin, in accordance with a Government law enacted on July 7th, 2006 for protecting the "natural territories", the Government approved a program to protect several natural habitats. These included the Kamyshlybash and Akshatau lakes. Thus SYNAS2 comprises improving the water diversion to these lakes, to contribute to the broader program goal of reviving their ecosystem and improving their potential for producing fisheries, musk beavers breeding and reeds (used for forage and dwelling construction).

The Government has also started rehabilitating irrigation and drainage systems on the lands located on Kazakhstan's lower Syr Darya Basin. The recently-signed World Bank supported project, Kazakhstan Irrigation and Drainage Improvement Project Phase-II (IDIP2), includes supporting rehabilitation of irrigation and drainage systems on the lower Syr Darya. As irrigation is the largest water user, one goal of SYNAS and SYNAS2 has been to help ensure adequate supplies to the irrigation systems, while ensuring environmenta l and domestic uses.

Relationship to CAS

The project is listed amongst the pipeline investments in the Country Partnership Strategy (CPS) of March 2012, under the CPS pillar "Ensuring Development is Environmentally Sustainable", under the "safeguarding the environment" outcome. Toward achieving this outcome, the CPS underscores the need to improve irrigation and drainage service delivery (IDIP2), land and water management for the benefit of sustainable increases in productivity in irrigated agriculture (both IDIP2 and SYNAS2), and increasing further the volume of the NAS and thus improving the related livelihoods (SYNAS2 and SYNAS3).

Relationship to the Bank's twin goal on eliminating poverty and boosting shared prosperity: The

SYNAS2 will contribute to the Bank's goals on shared prosperity and reducing poverty. The project will help protect the most vulnerable people from flooding and improve water provision for agriculture/aquaculture in rural areas. While Kazakhstan has made significant economic progress, poverty and income disparity are still common. Poverty has a strong regional character and it fell more rapidly in urban centers, thus becoming more of a rural phenomenon. An estimated 64% of all poor live in rural areas. Variations among oblast poverty rates are large, between 2% and 32%. Of Kazakhstan's 16 Oblasts, SYNAS2 will operate in two poorest of the six Oblasts that have the highest incidence of poverty: Kyzylorda and South-Kazakhstan.

II. Proposed Development Objective(s)

Proposed Development Objective(s) (From PCN)

The PDOs are to control flooding, achieve bulk-water savings, and improve water provision for developing aquaculture in the project areas along the Lower Syr Darya.

Key Results (From PCN)

The SYNAS2 results would thus be cross sectoral:

- To increase the Syr Darya mean-flow capacity in winter from 500 m3/sec to around 700 m3/sec, thus reducing bulk-water losses, increasing the reliability of irrigation diversions to around 62,000 ha amongst other water uses. The bulk-water savings may be monitored in percentage terms compared to a baseline set at an average year (e.g. average of the latest 20 years); and the end-of-project target could be set at the envisaged percentage savings/annum as averaged over the last three project years.
- To protect 30,000 persons against flooding, avoid inundation and damage of civil infrastructure.
- To improve the delta lake's water diversion capacity (for producing fishery and reeds).
- To strengthen the Government capacity in RBM, particularly in modeling.

III. Preliminary Description

Concept Description

The project would include three components, operating along the lower Syr Darya in Kazakshtan:

Component 1: Increasing the conveyance and flood-regulation capacity in the lower Syr Darya (US $43 million):

This component will help increase the Syr Darya mean flow capacity in winter from 500 to 700 m3/s, thus reducing water losses (for improved water provision including to the Delta Lakes and NAS) and contributing to protect settlements, cultivable lands, roads, and rail infrastructure against floods. It includes 3 subcomponents:

A. Riverbed straightening at Turumbet and Korgansha sections: to increase the river conveyance capacity, to pass winter floods and retain them in the flood-retention reservoir Koksarai. This includes cutting meanders at four sections along Syr Darya in Karmakchi district, thus increasing river slope, which increases the flow capacity;

B. Rehabilitate and develop 50 Km of flood protection dikes in Kazalinsk and Karmakchi districts;

C. Rehabilitate the left bank irrigation off-take at Kzylorda barrage: the irrigation canal head works would be repaired and protected against high floods; to avoid inundation of 60,000 ha of irrigable lands and damage to civil infrastructure; and

D. Construct road bridges near Birlik settlement in Kazalinsk district: This subproject will be the first road in Kazalinsk district which improves communication and transportation during the freight handling by motor transport. It will replace two existing low-capacity pontoon bridges by two modern bridges, thus curbing the risk of ice-jams in winter and also improving the river flow capacity (widening the river bed up to 200m).

Component 2: Improving water provision to the Syr Darya Delta Lakes (US$78 million):

This component will involve two subcomponents operating adjacent to NAS, and benefiting from the water-regulation improvements resulting from Component 1:
A. Rehabilitate delta lake systems in Aralsk district of Kzylorda oblast (Kamuishlibash and Akshatau lakes): This subcomponent will improve water supply to the lakes, by providing adequate hydraulic structures and conveyance canals, replacing the large number of makeshift intakes and temporary canals. By providing regulated water to the lakes together with operating better the Amanotkel weir and other control structures, the delta lakes will be revived, thus improving the biodiversity of the Syr Darya delta, fish production, and the processing of reeds used for fodder and house construction.
B. Reconstruct/extend fishery ponds at Tastak site of Kamuishlibash fish hatchery (Aralsk district, Kzylorda oblast): this will help utilize the fish production capacity of the NAS, delta lakes and Syr Darya, through artificial stocking of valuable fish species breading in the hatchery, thus improving the fishery-dependent employment.

Component 3: Enhancing river basin management, preparing the SYNAS3, and project coordination (US$5 million):

This component will involve three subcomponents:
A. Technical support for preparation of SYNAS3: the NAS restoration and the Kyzylorda RBM Center;
B. Strengthen the Government capacity in RBM (TBD by appraisal), through developing limited river-basin modeling and monitoring tools. These include: establishing new hydroposts and refitting gauging stations; developing the Mike 11 model that already exists in the country (was used to prepare SYNAS2); and/or developing a Decision Support System (DSS) using state-of-the-art approaches such as the open-access sources (using SYNAS2 funds, also possibly complemented through support from the ongoing Central Asia Energy-Water Development Program, CAEWDP). During SYNAS2 these tools will be developed up to the level needed to support the NAS feasibility study (as needed to prepare SYNAS3), whereas during SYNAS3 these tools will be developed further to support operational decisions as part of the Kyzylorda River Basin Management Center that will be established by SYNAS3; and
C. Project management, monitoring and evaluation (M&E), audit, and training.

Background on the NAS investment (SYNAS3):

The SYNAS2 was initially proposed to include a subproject for further restoration of the NAS. During the preparation of SYNAS2, after the Government drafted its Feasibility Study and EIA in 2010 (with Bank assistance), the following two design options for the NAS subproject were debated within the Government for around two years, without a decisive conclusion: (1) NAS design option 1: to raise only the Saryshiganak Bay to 50m BSL; hence NAS becomes a two-level sea (42m BSL and 50m BSL); by building a new dike and other auxiliary structures including: two ship Locks and

off-river canal to divert water from the river/lakes to the Bay; and (2) NAS design option 2: to raise further the entire NAS (by raising existing Kok-Aral Dike built in SYNAS1) from 42m to 48m BSL. Each option has its pros and cons; and each would cost indicatively around US$150 million. Concluding this debate required additional state-of-the-art modeling and detailed design for both options. Hence the Bank discussed with the Government a two-phase approach: SYNAS2 (2015 to 2021) including preparation of the FS for the NAS investment, and SYNAS3 (2017 to 2022) to implement the NAS investment. After a laborious dialogue, the Government officially agreed to this two-stage approach. The SYNAS3 may also support, in addition to the NAS investment: (i) establishing the Kyzylorda RBM Center which will utilize the modeling and monitoring tools introduced under SYNAS2, and possibly (ii) building an additional spillway for Chardera (TBD).

A possible DSS/modeling approach for the NAS-Syr Darya during SYNAS2 is to integrate: (i) simulation through rain-runoff forecasting and flood routing, using modules that integrate top-down open access data sources (based on remote sensing) with bottom-up in-situ data resources (e.g. calibration through data from hydrological observing stations HOSs); and (ii) optimization modules or multi-criteria decision scorecards. The integration of these tools will help prepare the long-debated NAS investment, and will strengthen the Government capacity in managing floods and in meeting the peak water demands.

IV. Safeguard Policies that might apply

Safeguard Policies Triggered by the Project	Yes	No	TBD
Environmental Assessment OP/BP 4.01	×		
Natural Habitats OP/BP 4.04	×		
Forests OP/BP 4.36		×	
Pest Management OP 4.09		×	
Physical Cultural Resources OP/BP 4.11		×	
Indigenous Peoples OP/BP 4.10		×	
Involuntary Resettlement OP/BP 4.12	×		
Safety of Dams OP/BP 4.37	×		
Projects on International Waterways OP/BP 7.50	×		
Projects in Disputed Areas OP/BP 7.60		×	

V. Financing (in USD Million)

Total Project Cost:	126.00	Total Bank Financing:	107.00
Financing Gap:	0.00		

Financing Source	Amount
Borrower	19.00
International Bank for Reconstruction and Development	107.00
Total	126.00

VI. Contact point

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