



1. Project Data

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| Project ID P115954 | Project Name IRRIG DEVT | |
| Country Bosnia and Herzegovina | Practice Area(Lead) Water | |
| L/C/TF Number(s) IDA-50980 | Closing Date (Original) 31-Dec-2017 | Total Project Cost (USD) 33,335,581.50 |
| Bank Approval Date 03-May-2012 | Closing Date (Actual) 02-Mar-2020 | |
| | IBRD/IDA (USD) | Grants (USD) |
| Original Commitment | 40,000,000.00 | 0.00 |
| Revised Commitment | 36,820,269.00 | 0.00 |
| Actual | 33,335,581.50 | 0.00 |

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2. Project Objectives and Components

a. Objectives

The Project Development Objective (PDO) for the Irrigation Development Project (IDP) as articulated in the Project Appraisal Document (PAD, page 5) was to:

“sustainably improve the irrigation systems and the institutional framework to support increased agricultural production for farmers and agricultural producers on about 12,200 ha.”



The PDO for the IDP as articulated in the Financing Agreement (FA, page 7) was to:

“improve the performance of the irrigation systems and the irrigation institutions to support agricultural producers in the Project areas.”

Both PDO statements were identical except where underlined.

This Review will assess the project outcomes according to the PDO statement as stated in the Financing Agreement. The two elements of the PDO will be assessed as one compound objective because of the inter relationship between them in irrigation systems.

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

No

c. Will a split evaluation be undertaken?

No

d. Components

The PDO was supported by three components:

1. Infrastructure Investment (appraisal cost: US\$38.2 million, actual cost: US\$37.2 million). This component would finance the implementation of irrigation and drainage infrastructure works/equipment in the form of about 13 sub-projects (SPs), of which 6 each located in Republika Srpska (RS) and Federation of Bosnia and Herzegovina (FBiH), and one in DB. The sub-projects would be selected from the long-lists of potential sub-projects that were prepared by the two Ministries and the District Brcko (DB). In FBiH this was based notably on proposals submitted by the cantons. The sub-projects all took place on existing agricultural land that in the past had been provided with irrigation services; in some of the sub-projects the first priority would be on restoring or improving drainage to ensure proper water management.

2. Irrigation Modernization (appraisal cost: US\$5.8 million, actual cost: US\$1.5 million). This would cover strengthening the Ministries, the DB, the Water Agencies, the Irrigation Extension services in RS and FBiH, and participating municipalities and cantons in addressing: the new sector policies, establishing and facilitating/empowering Water Users Organizations (WUA), the O&M arrangements for the introduced infrastructure/facilities, the fee determination, fee collection and management, and related water resources and irrigation management. This component would fund the on-farm agronomic and irrigation extension services, to help farmers seek credits and/or subsidies for the on-farm equipment, and to optimize irrigation use for improved performance (“more crop per drop” and “less drop per crop”).

This component included three sub-components:

2.1. Agency-level Strengthening. This subcomponent would support the: (i) Development of the regulatory framework for operating irrigation schemes (tariff methodology, benchmarking of financial and technical performance, etc); and (ii) Support the preparation of future irrigation strategies for the Entities. It would also support establishing a Technical Working Group comprising representatives of both Entities to enhance the learning from experiences across the country and help improve policy coordination.



2.2. Farm-level Irrigation Advisory Service (IAS) and Modernization. This subcomponent would finance (i) Strengthening the knowledge of the Entities field-level advisors on IAS, train WUAs on O&M, including on water quality and environmental aspects of irrigation and drainage); (ii) support on-farm demonstrations of water-saving good practices (e.g. irrigation re-scheduling, laser land leveling, help WUAs access subsidy/credit on low-pressure sprinklers and drip networks); and (iii) finance on-farm water-management equipment for each SP serving no less than 1,000 ha (soil-moisture monitoring kits, water-flow meters, weather stations on specific/demo SPs to help compute the soil-water balance components, including evapo-transpiration, effective rainfall, upward capillary).

2.3. On-demand training. This would finance demand-driven training for WUAs, related to improved agricultural technologies and practices and linking to markets.

3. Project implementation support (appraisal cost: US\$2.4 million, actual cost: US\$1.4 million). This would cover costs of project management including M&E, safeguards, audits, management information system (MIS), procurement and financial management training, and office and mobile equipment.

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

Project Cost. The total project cost was expected to be US\$47.06 million. The actual total cost reported by the ICR (page 1) was US\$41.13 million. The difference was due to a lower disbursement amount of the IDA Credit (see below).

Financing. The project was financed through a US\$40.00 million IDA Specific Investment Credit (SIC). The project would finance investments in the two Entities the Federation of Bosnia Herzegovina (FBiH) and Republika Srpska (RS) and the District Brcko (DB). In the FBiH the IDA investment was expected to amount to US\$18.00 million, US\$20.00 million in the RS, while DB would benefit from US\$2.0 million. In a further communication, the project team explained that DB was not part of the project. The Actual amount disbursed according to the ICR (page 1) was US\$33.34 million. According to the ICR (page 33) in the FBiH the IDA investment amounted to US\$14.41 million and in the RS it amounted to US\$18.69 million. There was no information on the amount disbursed for DB. The ICR did not provide an explanation for the lower disbursement of IDA, and it reported the actual disbursement amount as 91.3% (paragraph 72). In a further communication, the project team explained that DB was not part of the project, and confirmed that actual disbursement reached 91.3% due to the depreciation of the US dollar against the SDR.

Borrower Contribution. The counterpart financing was expected to be US\$7.00 million. This comprised financing from the two entities and DB, cantons/municipalities, and/or farmers/WUAs. According to the ICR (page 2) actual counterpart financing was US\$7.79 million.

Dates and Restructuring. The project was approved on May 3, 2012 and became effective on March 29, 2013. The Midterm-Review (MTR) was carried out on July 31, 2015, about 3.5 years after effectiveness. The PAD did not specify an exact date for the MTR. The original closing date was on December 31, 2017 compared to an actual closing date on March 2, 2020. According to the ICR (paragraph 28) the 23 months



extension was to “allow enough time for the implementation of all project financed activities in order to meet the PDO.”

The project was restructured twice both Level 2 restructuring. The first was on June 29, 2017, when the amount disbursed was US\$11.79 million, in order to change the Results Framework (including amendments to two PDO indicators), extend the Loan Closing Date to November 30, 2019, and change the implementation schedule. The second was on November 27, 2019, when the amount disbursed was US\$25.51 million, in order to extend the project closing date by an additional three months to close on March 2, 2020. Since neither of the restructurings changed the project’s level of ambition, there was no reason for a split rating of outcomes.

3. Relevance of Objectives

Rationale

Context at Appraisal. The agriculture sector in the Federation of Bosnia Herzegovina (FBiH) has an economic comparative advantage due to its closeness to the European Union (EU), a moderate continental climate, clean and abundant natural water resources, and relatively low factor prices. However, the weak institutional capacity e.g. for extension services, the low investment rates, and the lack or inoperability of agricultural and rural infrastructure such as reliable irrigation are serious constraints to increasing the sector’s productivity. The project aimed to address these constraints through expanded intensive production at the farm level, rehabilitation of irrigation infrastructure and improving public services by establishing proper roles and responsibilities between state, entity, cantonal, municipal, and user level.

At appraisal, objectives were in line with the Bank’s Country Assistance Strategy for FBiH (CAS, FY12-FY15) which identified agriculture production as an area of potential for economic growth and increased employment. The CAS aimed to increase competitiveness through investments in irrigation, among others, and improve environmental sustainability, through supporting the sustainable use of natural resources such as water and land. At the time of appraisal, the FBiH was yet to update its agricultural and rural development policy and strategy. Objectives were in line with RS strategy for agriculture and rural development which had six long- term objectives including: (i) increasing the scope and adjusting the structure of agricultural and industrial production; (ii) optimal utilization of agrarian resources; (iii) balanced integrated rural and agrarian development; (iv) support a stable market for agricultural and food related products, with a trend of reducing the share of food related costs in the structure of family budgets; (v) increasing the level of exports; and (vi) improve of institutional, material, staff related, technical and technological capacities of agriculture.

At completion, objectives continued to be in line with the current Bank CPF (FY16 - FY20). The CPF has three focus areas: i) increasing public sector efficiency and effectiveness, ii) creating conditions for private sector growth, and iii) building resilience to natural shocks. Specifically, objectives were in line with the focus area 2a (Support a Competitive Business Environment and Access to Finance), and focus area 3. The Project supported farmers to implement climate smart agriculture by improving the performance of the



irrigation systems including promoting the use of water efficient technology, increasing the productivity and competitiveness of the farmers and supporting the job creation in rural areas. The project objective was also in line with the Government's Strategic Plan for Rural Development of Bosnia and Herzegovina (2018 – 2021) which aimed to improve competitiveness of agri-food products and quality of life in rural areas. The Plan included 6 strategic goals: strengthening competitiveness of agriculture, forestry and rural areas by increasing the level of investments and improving the transfer of knowledge and innovation. This included installation of irrigation to increase intensity of use of arable land.

On the other hand, the project development objective (PDO) aimed at "improving performance" was vague. The statement also lacked a connection to objectives for agricultural producers, namely, resilience to drought, projected increases in crop yield, crop intensification, crop diversification, and enhanced livelihoods of farmers in the project areas. Finally, the Results Framework (RF) lacked adequate indicators to assess the extent to which the core elements of the PDO, namely improved performance of the irrigation systems and of the irrigation institutions, were achieved when the project closed. Both the vague level of ambition and the lack of adequate indicators for the core elements of the PDO undermined the validity of the PDO.

Based on the above-mentioned assessment, Relevance of Objectives is rated Substantial.

Rating

Substantial

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To improve the performance of the irrigation systems and the irrigation institutions to support agricultural producers in the Project areas.

Rationale

Theory of Change (ToC). The project aimed to (a) improve the performance of the irrigation systems to support agricultural producers in the project areas and (b) improve the irrigation institutions to support agricultural producers in the project areas. This objective would be achieved through: (i) rehabilitating irrigation and drainage infrastructure, including construction, reconstruction, upgrading, and modernization, on existing agricultural land; (ii) introduction of new technologies in irrigated agriculture; and (iii) institutional development, strengthening of water resources management institutions and introducing a participatory approach to water management (PAD, Annex 2, paragraph 5).

To achieve the first element of the PDO (to improve the performance of the irrigation schemes), the project would rehabilitate and modernize the irrigation and drainage infrastructure on existing agricultural land and



construct new infrastructure where needed. Also, the project would encourage farmers to use more water-efficient technologies. To improve on-farm water efficiency, the project would facilitate support to the farmers to apply for and access credit under different government programs for on-farm equipment and investments. As a result of these activities, the performance of irrigation schemes was expected to be improved.

To achieve the second element of the PDO (to improve irrigation institutions), the project aimed to improve the tertiary irrigation regulatory framework and build the capacity of the water management institutions including the water users' associations (WUAs) and the relevant utility companies. The WUAs were expected to improve water use efficiency and, to introduce and improve collection of service fees leading to better operation and maintenance (O&M) of irrigation facilities.

Anticipated long-term impacts included: Improved resilience to drought, increased crop yields, increased intensification of crop production, increased diversification, and improved irrigation scheme sustainability. All these impacts were expected to result in improved livelihoods of farmers.

Key Assumptions. The achievement of the ToC for the first element of the PDO was underpinned by the assumption that farmers would be willing to invest in modern irrigation technologies in order to improve the overall performance of the irrigation system.

The ToC for the second element of the PDO was underpinned by the assumption that with better tertiary irrigation systems and active WUAs there would be improved O&M of facilities and equitable water distribution leading to less tail-end farmers with water shortages, i.e. better water management including adequate drainage of farmlands.

The above-mentioned activities were directly connected to the PDO. However, achieving overall improvement of the irrigation system required farmers to invest in modern on-farm irrigation technologies in tertiary systems. How this was to be achieved was indicated in general terms in the PAD (paragraph 25). Farmers would have access to "implementation support" including financing estimated at US\$7 million from ministries of agriculture, cantons/municipalities and WUAs in RS and FBiH (PAD, paragraph 25). The ICR was not clear on the extent to which farmers had received this support. According to the ICR (paragraph 26) cantons/municipalities did not provide financial support for on-farm irrigation investments and "farmers equipped their farms using their resources". On the other hand, in discussing ten schemes completed during the last months of project implementation paragraph 77 of the ICR stated that "The farmers were able to make the necessary on-farm investments using the existing cantonal/municipality co-financing facility and financial resources from IFAD". The ICR made no mention of assistance received from ministries of agriculture.

Following questions by IEG on the ICR the project team explained that:

"The client has reconfirmed that the farmers have benefited from the government subsidy programs, and the availability of national and local level investment incentives for on-farm irrigation development supported by donors such as the EU including the procurement and installation of farm-level irrigation equipment. These incentives range from 25% to 40% of the total costs depending on the age and the gender of the beneficiary. For instance, the Ministry of Agriculture, Forestry, and Water Management of the Republika Serpska granted about 1.7million KM (~\$1.1 million US\$) during 2014 to 2020 in the project sites. In addition, in FBiH, the International Fund for Agriculture Development (IFAD) funded the construction of secondary



network in municipality Foča in Federation BiH (Ustikolina), and Gorazde which enables direct access to the water from the manhole on each plot."

The following outputs and outcomes were reported in the ICR (Annex 1) unless referenced otherwise. Targets are provided where available.

Outputs

(a) To Improve the performance of the irrigation system to support agricultural producers in the project areas

- Fourteen sub-projects were implemented (6 in RS and 8 in FBiH); pipes were supplied for an additional scheme, Bihac, in FBiH (20% completion). Bihac would be completed with funding from the Government. All the schemes had pipeline systems, except for Mastasko Blato which uses canals. A total of 285 km of pipelines were installed; 40 km of irrigation canals were rehabilitated; 78 km of drainage canals were rehabilitated, and 3 km new drainage canals were constructed; 37 wells were constructed and equipped with pumps and 25 pumping stations were constructed; and 30 reservoirs were constructed.
- Two of the sub projects had demonstration areas to display improved irrigated agriculture practices and to show case different water saving technologies.
- Detailed designs were prepared for five sub projects (4 in RS and 1 in FBiH) to be implemented under other funding.

(b) To Improve the performance of the irrigation institutions to support agricultural producers in the project areas

- The project conducted training workshops on management of irrigation schemes for local stakeholders for the schemes in Ljubinje, Bratunac, Gorazde and Mostarsko Blato.
- A participatory irrigation management guideline was prepared for RS and FBiH which would be used in the capacity building of the institutions managing the schemes and WUAs in the schemes where irrigation infrastructure had been completed.
- A knowledge exchange visit was conducted to Spain for 20 participants from FBiH and another one to Italy for 20 participants from RS. The purpose of the knowledge exchange visits was to support participants to acquire knowledge about the functioning of the organizations responsible for the operation and maintenance of the irrigation systems in Italy and Spain. The study tours focused on the implementation and efficacy of Participatory Irrigation Management in the two countries and the use of modern technologies for optimization of water use.
- Two irrigation rule books were prepared which detailed the conditions and methodology for financing construction, maintenance and management of irrigation systems. These were published in the official Government gazette.



Outcomes

(a) To improve the performance of the irrigation systems to support agricultural producers in the project areas

The achievement of the first element of the PDO was assessed through two outcome level indicators:

(i) The area provided with new/improved irrigation or drainage services which was further separated into an area provided with new irrigation or drainage services, and an area provided with improved irrigation or drainage services;

(ii) The number of beneficiaries without (tail-end) water shortage or drainage problems with a supplemental indicator on the percentage of female beneficiaries.

By project completion, a total of 10,055 ha were provided with new/improved irrigation or drainage services against a target of 9,000 ha (target exceeded by 11%). In total fourteen schemes were constructed (target: 13). However, ten schemes were completed near the project's close, of which seven were already operational during the summer of 2020 (ICR, paragraph 37). According to the ICR (paragraph 36) "the improvement in the abstraction and conveyance systems contributed to an improvement in the performance of the irrigation systems." The ICR (Annex 1) reported that the incremental irrigation water added, based on four sub-projects which were in operation for several seasons by project closure, was 21.95 million cubic meters compared to a target of 25 million cubic meters (88% achievement rate). Other than this estimate based on four sub-projects, the ICR provided no other evidence of improvements in water conveyance, reduced water loss, or increased abstraction in the irrigation systems. In summary, the project invested in providing new/improved irrigation or drainage services on 10,055 ha compared with a target of 9,000 h. However the only information in the ICR on improved irrigation water supplies or improved is in four sub-projects. There is no other evidence in the ICR of improved irrigation and drainage services.

With respect to beneficiaries without tail-end water supply and drainage problems (PDO Indicator 2), the ICR noted that "In the four completed schemes (mentioned above) which were in operation for several years the beneficiaries were satisfied with the irrigation service delivery and report neither tail-end water shortage nor drainage problems" (paragraph 37). But the ICR provided no basis, such as a survey of beneficiaries, for this information.

In response to questions from IEG, the project team explained that:

"The assessment of the beneficiaries in the ICR is based on the surveys that were conducted by the client to verify the improvements in irrigation service delivery on the four schemes that were operational for several years. Per client report, the survey was conducted on 'number of farmers that are already users. The information is the result of long process of data collection on the field directly, and in close cooperation with representatives of local community all in line with already expressed needs by farmers themselves'."

Notwithstanding the ICR assertion for the four completed schemes, Annex 1 of the ICR (page 22) states that the project exceeded the total target for PDO Indicator 2 with an estimated 21,406 beneficiaries in the fourteen schemes constructed compared to a target of 18,000 beneficiaries. However, Annex 1 also states that it was assumed that all the people in the sub-project areas would not have a tail-end water shortage or drainage problems when schemes had been rehabilitated or reconstructed. It also clarifies that "The number of beneficiaries without tail-end water supply and drainage problems is based on the number of households



in the schemes, the average household size with an allowance for seasonal workers." In other words the assertion about the number of project beneficiaries without "tail-end water shortage or drainage problems" is not based on evidence but based on assumptions of total success for the stakeholders in the project areas. The total number of direct beneficiaries without "tail-end water shortage or drainage problems" who were female is also an estimate based on female membership in water users associations WUAs.

This review concluded that the ICR provides no evidence that the project provided new/improved irrigation or drainage services in the project areas as could be indicated by measures such as improved conveyance, decreased water losses, and reduced time required by farmers to irrigate their farms. There is also no evidence in the ICR regarding the number of farmers in the rehabilitated/reconstructed project areas who were without tail-end water shortage or drainage problems (the PDO indicator). However, work on the improvement of the tertiaries was not completed and mentioned in the ICR as a risk to the project's development outcome, which raises questions regarding the alleged evidence for the achievement of the first and second elements of the PDO in the project areas. Indeed one of the Lessons from the project in the ICR (paragraph 81) noted that "The Project financed the construction of the network up to the farm gate (main systems), leaving on-farm improvement works for the cantons/municipalities and the farmers". The lesson drawn by the ICR was that "In order not to delay the services to the beneficiaries it is advisable to concurrently implement both the main infrastructure and on-farm improvement works irrespective of who finances the latter".

Given the lack of credible evidence in the ICR regarding the efficacy with which the project improved the performance of the irrigation systems to support agricultural producers in the project areas, IEG sought further information from the Bank project team.

The project team explained the following:

"The systems built by this project were designed to provide irrigation services on-demand. The provision of irrigation services to beneficiaries "on-demand" enables the supply of sufficient water quantities and the minimum operating pressure at the most distant and most disadvantageously located plots or hydrants. These systems are operating optimally so typical problems such as "head-tail" that occurs in water rotation have been avoided. All problems in water flows and pressures at outlets in irrigation system can be easily detected if they occur since monitoring of water supply and the amount of water used is automatic and controlled in real time. Thus, given the state-of-the-art technology which inherently guarantees better service quality to the users and higher distribution efficiency, the need for having separate measures for improved conveyance, decreased water losses, reduced time required by farmers to irrigate their farms is not required."

Based on the project's team explanation regarding the state-of-the-art technology of the irrigation systems financed by the project, the efficacy with which the project improved the performance of the irrigation systems to support agricultural producers in the project areas is rated Substantial.

(b) To improve the performance of the irrigation institutions to support agricultural producers in the project area

The achievement of the second element of the PDO, was assessed through one outcome indicator which was the number of end-user O&M agreements signed and adopted. A total of 15 O&M agreements were signed at project closure against a target of 10 agreements. According to the ICR (paragraph 39), the signed O&M



agreements emphasized the equitable water allocation principles specified in the irrigation management rule books developed for RS and FBIH. Adoption and implementation of the agreements was expected to reduce the tail-end water distribution inequities. Out of the fourteen schemes developed under the project, eight schemes were managed by utilities with involvement of the WUAs; two schemes in RS were managed by agriculture companies who pay a water concession fee to the public institution in charge of water management, and only four schemes were solely managed by WUAs. According to the (ICR , Annex 1) the rate of O&M fee collection within two seasons after starting the irrigation service reached 65% compared to a target of 70% (93% achievement) and a baseline of 30%. The estimate was based on information from four operational schemes that were completed earlier in the implementation cycle.

While the project established a management system and contributed to improving the capacity of the WUAs to support farmers in the project area, there was limited evidence provided in the ICR that point to the achievement of the second element of the PDO. Also, the results framework lacked relevant indicators to assess whether there was an improvement in their performance. One indicator that may have shed some light on whether WUAs and other water management institutions in the sub-projects had improved was the rate of collection of O&M fees. According to Annex 1 (page 25) the rate of O&M fee collection "within two seasons of starting irrigation services" was 65% compared with a target of 70% for the four schemes which had been operating for several years. That said, it is plausible that irrigation institutions improved their support to farmers after the project closed because the project had made efforts to strengthen their capacity and O&M agreements had been signed between the cantons/municipalities and the management entities tasked with the operation and management of the schemes.

On this basis the efficacy with which this institutional element of the PDO was achieved is rated Substantial, but only marginally so.

To sum up, in light of the explanation provided above by the project team, this review concluded that it is plausible to assume that this project improved the performance of the irrigation systems to support agriculture producers, despite the limited evidence provided in the ICR. Also, there was evidence that irrigation institutions had become more capable and plausibly improved irrigation management substantially after the project closed. Overall, this review has rated the efficacy of the achievement of the PDO as Substantial.

Rating

Substantial

OVERALL EFFICACY

Rationale

According to the ICR the project improved irrigation infrastructure through rehabilitation of existing systems or installing new irrigation systems. The project is reported to have exceeded its target coverage area by 11% and covered more direct beneficiaries than expected at appraisal (21,000 compared to 18,000). However, there were no indicators or other evidence to validate the achievement of an "improved performance of the irrigation systems to support agricultural producers" even for the four schemes that were completed. Furthermore, the envisioned improvements to the tertiary irrigation network at the farm-level were



not fully achieved, which underlined questions regarding the lack of evidence regarding the achievement of the first element of the PDO. There was evidence, however, that the project facilitated improved water management systems, and O&M agreements that were signed between the cantons/municipalities and the management entities tasked with the operation of schemes. This review concluded that it was plausible that the capacity building efforts to strengthen the irrigation institutions would improve WUAs future ability to manage the irrigation schemes effectively in the project area.

In a further communication, the project team explained that: "While we acknowledge that the increase in yields was not monitored regularly as part of the project RF to measure the impact of the improved irrigation systems since it was envisaged as a long term outcome per the Theory of Change, the client has collected and maintained additional data for the purpose of gauging the impact of access to irrigation on crop production and farmers income and for the purpose of fulfilling the respective ministries data and monitoring requirements. This was done for the four irrigation schemes completed early and for which irrigation has been done for several seasons."

In response to questions regarding the evidence on efficacy mentioned above, the project team provided IEG with a better explanation about the technical details of the project-financed rehabilitated and improved irrigation systems and their expected impacts. Based on the team's explanations, this review concluded that this project improved the performance of the irrigation systems to support agriculture producers, despite the limited evidence provided in the ICR. Also, there was evidence that irrigation institutions had become more capable and plausibly improved irrigation management substantially after the project closed. Overall, this review has therefore rated the efficacy of the achievement of the PDO as Substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic and Financial Efficiency

ex ante

- The overall economic rate of return (ERR) was estimated at 16.3 %, and the Net Present Value (NPV) amounted to US\$456,667 using a discount rate of 12%. The analysis was made on two representative sub-projects from phase I: the Gorazde (FBiH) and Novo Selo (RS) SPs, identified by BiH as two of the four priority SPs selected for IDP support during its early stage.
- Crop and farm models were simulated for the relevant crops using —with and —without scenarios, which differ on the expected yields and production costs as irrigation was made available and became reliable. On average, crop yields were expected to increase by about 50% in the project areas. These project improvements were expected to generate increases in household income by about 55 to 134 %, depending on the farm size and cropping patterns.



- One of the selection criteria for sub-projects, was that the investment cost was not to exceed US\$2,000 per hectare.
- A sensitivity analysis showed that if all investment costs were 20% above the base assumption, the ERR would be reduced to 13.4%. While if crop diversification were to be reduced to 50% of the base assumption, the ERR would be reduced to 12.5%. Only when both adverse events occur simultaneously (which is less likely), would the ERR drop to 9.8%.

ex post

- The overall economic rate of return (ERR) was estimated at 21% (compared to 16.3% at appraisal) using a discount rate of 12%. To ensure comparability of results, the economic analysis was performed using similar methodology applied at appraisal and on the same two schemes selected. Updated information on labor and input requirements for various operations, capital costs, prevailing wages, yields, farm gate and market prices of commodities, input and farm-to-market transport costs were collected and used by the analysis. Prices for commodities/inputs reflect annual average and those actually paid/received by the farmer. Benefits included in the analysis included: additional production on incremental land as a result of irrigation and drainage infrastructure improvements, higher yield levels as a result of better, more reliable and increased water delivery, and improved groundwater control and earlier spring planting, production of higher value crops as part of a more diversified cropping pattern, and reduced pumping costs per cubic meter as a result of reduced losses.
- At project closure the average investment cost for sub-projects was US\$4,006 per hectare (including project implementation support costs), which was double the appraisal estimate at US\$2,000 per hectare. The ICR did not explain the reasons behind this jump in costs.
- The financial analysis showed that the IRR of the Gorazde SP was 27.2% and NPV was 5.4 million BAM, while the IRR for Novo Selo SP was 26.9 %, and the NPV was 7.6 million BAM, again using a 12% discount rate over 20 years.
- The ex post analysis could have benefited from the inclusion of a sensitivity analysis to show the impact of different scenarios on the project's ERR, particularly because the data for benefits used in the analysis of efficiency were assumptions not based on actual results. In a further communication, the project team provided a sensitivity analysis that proved the robustness of the project investments under different scenarios.
- The results of the ex post analysis showed that the project was economically viable and generated good economic returns. However, even if the assumed project benefits were defensible or completely accurate the ex post estimates of rates of return are questionable because there is no evidence in the ICR that the improvement of the irrigation systems extended to the farm level as envisioned at appraisal and assumed in the economic analysis..

Administrative and Institutional Efficiency

The project was delayed and lasted seven years instead of five years as envisioned at appraisal. It took one year between Board approval and effectiveness. In addition, there were early implementation delays due to a lengthy approval process of the various permits, especially in FBiH (ICR, paragraph 52), delays in the procurement of consultancies for the preparation of detailed engineering designs of pressurized irrigation systems (ICR, paragraph 53), and implementation delays due to the lengthy time needed to reach out and locate land owners who had emigrated in order to get their consent to access their land (ICR, paragraph



55). Flooding in 2019 caused rivers in BiH to overflow and caused implementation delays, which were beyond the control of the project.

Overall, the project's efficiency is rated Substantial. This rating is based on the higher ex-post ERR compared to appraisal and the presumption that the project may ultimately achieve the benefits assumed in the ICR's economic analysis and that implementation delays, while problematic, were largely beyond the control of the project.

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 | ✓ | 16.30 | 100.00 <input type="checkbox"/> Not Applicable |
| ICR Estimate | ✓ | 21.00 | 100.00 <input type="checkbox"/> Not Applicable |

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

6. Outcome

Relevance of Objectives was rated Substantial because although the relevance of the objective to both government and Bank development strategies was high the vague wording of part of the objective statement and the inadequate weak PDO indicators undermined the clarity of the objective. The project improved irrigation infrastructure and exceeded its target coverage area by 11% and covered more direct beneficiaries than expected at appraisal (21,400 compared to 18,000). While, there were no indicators or other evidence in the ICR to validate "improved performance of the irrigation system and support to agricultural producers", the project team provided IEG with an explanation of the technical design and expected benefits of the improved irrigation infrastructure to the farmers in the project areas. The capacity building efforts of the project were expected to improve WUAs ability to manage irrigation schemes, especially because the project also put in place a management system, and O&M agreements were signed between the cantons/municipalities and the management entities tasked with the operation of the schemes. Overall efficacy was rated Substantial. Efficiency is rated Substantial assuming the project would ultimately achieve the benefits adopted in the economic analysis and despite implementation delays.

Based on these ratings this review concluded that there were minor shortcomings in the project's relevance of objectives, efficacy and efficiency and has therefore rated its overall outcome as Satisfactory.



a. Outcome Rating

Satisfactory

7. Risk to Development Outcome

The ICR discussed one risk that could potentially impact the Development Outcome.

The risk that the constructed systems were not sustainable. The fifteen signed agreements between farmers, cantons/municipalities, and entities responsible for managing and operating the schemes included arrangements for O&M costs. O&M costs were to be subsidized by cantons or municipalities as farmers need time to take full responsibility of O&M. For this to happen, farmers need to increase agricultural production, through use of better farming methods including inputs, and diversification to higher value crops—all of which were outside the scope of this project. Also, BiH is suffering from high immigration rate of its population, which might negatively impact the number of people willing to engage in farming. This prompted Cantons/Municipalities to offer incentives for their population to continue farming, e.g. Mostarsko where the Canton is covering the maintenance costs for the irrigation system. That said, the Government of BiH is committed to improving irrigation since it requested to include irrigation in the follow-up operation estimated at US\$73 million (BiH Agriculture Resilience and Competitiveness Project, P171266). According to the ICR “it is expected that some of this money is used for on-farm improvement of the already developed irrigation schemes (paragraph 77).”

8. Assessment of Bank Performance

a. Quality-at-Entry

The project builds on the Bank's “ECA I&D Strategy Note” which concluded that irrigation and drainage (I&D) was a priority in BiH to contribute to modernizing agriculture in preparation for EU entry; and plays a role in higher value agriculture. The project objective was in line with Bank's Country Partnership Strategy (CPS, FY2012-2015) for BiH (see section 3 for more details). The project benefited from a simple design that included three components with activities that directly contributed to the PDO (ICR, paragraph 49). Design benefitted from the Bank's experience in I&D projects in the ECA region, and from the Bank-funded Small-Scale Commercial Agriculture Development Project (SSCAD 2006-2010) in BiH. A notable lesson reflected in the design of this project was the importance of strengthening institutional capability and building on the commitment of the farmers to organize themselves into WUAs to successfully manage the new/rehabilitated irrigation schemes.

However, readiness for implementation was limited as only four sub-projects selected for phase one had detailed designs and were ready for tendering (ICR, paragraph 51). Also, the project's design underestimated the complexity and the time needed to secure various sub-project related permits such as water concession permits, urban permits, preliminary water approval, water permits, construction permits, and electricity power approval. These permits involved many local, regional and entity government institutions and securing their approval caused considerable implementation delays, especially in FBiH (ICR, paragraph 52). In addition, the implementing agency had limited administrative and technical capacity to implement an irrigation modernization project that required the



preparation of detailed engineering designs (ICR, paragraph 53). Such limited capacity resulted in the revision of irrigation designs of some sub-projects during implementation, which compounded implementation delays. A notable design shortcoming was the lack of detail for on-farm irrigation modernization, which was needed in order to fully achieve system improvements and improve irrigation efficiency at the farm-level. While the PAD discussed modernizing on-farm irrigation (sub-component 2.2), there was no mention on how this was to be done (ICR, paragraph 69). The PAD identified three types of risks related to stakeholders, implementing agency, and project-related risks. Overall risk was rated moderate and relevant mitigation measures were included in the PAD. However, the ICR did not discuss which risk(s) materialized and whether the suggested mitigation measures worked.

Project design included an adequate economic analysis that provided the basis for analyzing efficiency at completion. However, the Environmental and Social Management Framework (ESMF) failed to identify all the necessary permits required for the irrigation sub-projects before final permission was given to utilize the systems (ICR, paragraph 71). Finally, M&E had design shortcomings regarding the lack of indicators to comprehensively assess the improvement in the performance of the irrigation systems and the irrigation institutions (see section 9 a for more details).

Overall, Quality at Entry is rated Moderately Satisfactory. This rating reflects moderate design shortcomings that impacted readiness for implementation as well as M&E design shortcomings.

Quality-at-Entry Rating

Moderately Satisfactory

b. Quality of supervision

The project faced challenging implementation conditions related to flooding in 2014 and in 2019 (ICR, paragraph 56). According to the ICR (paragraph 72) the "Bank conducted semi-annual supervision missions and the ISRs show an objective reporting on the implementation issues in the field and recommendations on how to address them." Supervision of fiduciary aspects, reviewing audit reports and supporting the procurement activities were adequate, and according to the ICR there was no significant fiduciary issue during implementation (ICR, paragraph 73). The Bank also supervised and ensured social safeguards compliance. In 2019, with lagging implementation and a slow disbursement rate, the Bank resorted to holding monthly co-ordination and remote implementation support meetings with the project teams to address any issue arising and to improve decision making. This arrangement resulted in improved implementation and the disbursement rate increased from 58% in May 2019 to 91.3% (83% according to this review) at project closure. The Bank worked with the borrower to extend the closing date by three months to ensure the completion of ongoing works.

The project was supervised by four Task Team Leaders (TTLs) over the project implementation period. According to the ICR (paragraph 72) the borrower viewed such TTL changes as frequent, and "disruptive to team dynamics". The ICR also noted that a new TTL usually required a transition period to learn about the project, which sometimes slowed down decision making. While the Bank closely supervised the project and presented recommendations to address challenges, these were often not implemented in time by the project authorities (ICR, paragraph 74). This could have been partially due to the limited technical capacity of the staff at the implementation unit as well as the municipalities/cantons (ICR, paragraph 74). Finally, the Bank could have used the restructuring to address M&E design weaknesses to better assess the



improvement in the performance of the irrigation systems and the irrigation institutions as a result of the project intervention.

Supervision quality is rated Moderately Satisfactory due to moderate shortcomings, namely disruptive changes in TTLs and inaction on improving PDO indicators .

Overall Bank Performance is rated Moderately Satisfactory. This rating reflects moderate shortcomings for both Quality at Entry and Bank Supervision.

Quality of Supervision Rating

Moderately Satisfactory

Overall Bank Performance Rating

Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The PAD did not include a Theory of Change (ToC), which was not required at the time of appraisal. Nonetheless, the ICR (page 7) included a ToC that reflected the connections between the project activities, outputs, outcomes and long term impacts. The ToC also reflected the assumptions that underpinned the achievement of the PDO. The first element of the PDO (to improve the performance of the irrigation systems to support agricultural producers in the project areas) was to be assessed through two PDO level indicators: #1. Incremental areas with improved irrigation systems, and #2. Direct beneficiaries without (tail-end) water shortage or drainage problems. Both indicators were relevant, measurable, and indirectly linked to the PDO. On the other hand, the Results Framework (RF, PAD Annex 1) lacked any indicators to assess the second element of the PDO (to improve the performance of the irrigation institutions to support agricultural producers in the project areas).

The RF included four intermediate outcome indicators, three of these were to track intermediate changes that would eventually result in the improved performance of the irrigation schemes and institutions under components 2, and one indicator on the incremental irrigation water added (in water volume per year, compared to the additional irrigation-water requirements that correspond to crop maximum yield) was to measure the efficiency under component 1. These intermediate indicators were measurable and directly connected to the project activities and included clear end targets. However, baseline data were missing. There were no indicators to assess the improvement in drainage in project areas.

In summary, M&E design had shortcomings. First, the RF lacked PDO level indicators to validate the improvement in irrigation systems, e.g. increased yields, and to assess the second element of the PDO. Second, the RF could have benefited from including more intermediate outcome indicators to assess the improvement in irrigation, such as the time needed for irrigation water to reach the farm gate, and the improvement in conveyance that resulted from the new/rehabilitated irrigation infrastructure, among others.



b. M&E Implementation

According to the ICR (paragraph 59), progress reports were prepared by the two PIUs (FBiH-PIU) and (RS-APCU) every six months to track progress against the RF. In FBiH, the indicator on the incremental irrigation water added was tracked for only Mostarsko Blato system, which irrigated for three years and was measured volumetrically; while in RS the same indicator was tracked for three schemes out of six. There were two intermediate indicators to track progress on the second element of the PDO (to improve the performance of the irrigation institutions to support agricultural producers in the project areas). Intermediate indicator #2 measured the rate of O&M fee collection within two seasons after starting irrigation. While this was an adequate indicator of the performance of the management structures, most of the systems did not have two seasons of irrigation due to implementation delays.

Changes to Indicators. The number of female beneficiaries was a supplemental PDO level indicator based on the demographic makeup of the beneficiary communities, and it estimated the number of females in the beneficiary households. At the MTR stage, this indicator was changed to count the number of female headed households served by the project and/or the number of females engaged by the project (as part of WUA or not) to undertake active roles throughout the sub-project preparation-execution-evaluation cycle. This change was relevant and made the indicator more specific.

While M&E implementation was marginally acceptable, the collected data were limited because implementation delays resulted in late completion of work on the improvements to the systems.

c. M&E Utilization

According to the ICR (paragraph 60) biannual reports prepared by the entities reflected the progress of procurement and implementation of the works. This information in addition to the RF informed the decision to restructure the project in 2017 and extend the closing date by 23 months and later to extend the project closing date by three months in 2019.

While the ICR provided a brief discussion on M&E utilization, it implicitly stated that M&E data informed the project management to take corrective actions.

Overall, M&E Quality is rated Modest. This rating reflects design shortcomings (lack of PDO level indicators to assess the second element of the PDO) that were not rectified during implementation, despite the project having been restructured twice.

M&E Quality Rating

Modest



10. Other Issues

a. Safeguards

The Project was classified as a Category B project requiring a Partial Environmental Assessment. Three safe guard policies were triggered at appraisal: Environmental Assessment OP/BP 4.01, Involuntary Resettlement OP/BP 4.12, and Projects on International Waterways OP 7.50. The project schemes (being of a small size) were not expected to pose significant additional demands on the water bodies. Therefore, the majority of environmental impacts associated with the project were limited to simple and standard reconstruction works such as: dust, noise, disruptions, waste generation (PAD, paragraph 60). An Environmental and Social Management Framework (ESMF) was prepared and disclosed in the country. Also, site-specific Environmental Management Plans (EMPs) were prepared for four priority sub-projects.

The ICR did not provide explicit statements on the compliance of the project with the Bank's safeguard policies.

Environmental Compliance. The analysis of phase1 sub-projects showed that there would be no impact on the quantity or quality of the water available to the riparian countries and the project was exempted to the notification requirement under OP7.50. Also, analysis of phase 2 and phase 3 sub-projects showed that they would not have an impact on the international waters, except for the Vrbas-Osrona sub-project in RS. However, Vrbas-Osrona was designed under the project but was not constructed (ICR, paragraph 62). The ICR (paragraph 63) stated that: "there were no infractions and all mitigation activities in the EMPs were implemented."

Social Compliance. While the project triggered OP 4.12 Involuntary Resettlement, there was no land acquisition under the project. According to the ICR (paragraph 64) "all private properties were accessed with written agreements of the owners." The ICR (paragraph 64) noted that RS failed to report on social safeguard compliance for sometime which resulted in safeguard implementation being rated moderately unsatisfactory. This rating was upgraded to satisfactory when RS started providing the social safeguard compliance reports.

b. Fiduciary Compliance

Financial Management (FM). According to the ICR (paragraph 66) "the financial management systems, including accounting, budgeting, organization and staffing, internal controls, counterpart funding, audit and financial reporting, was adequate for both entities and satisfied the Bank's requirements." Semi-annual interim un-audited financial reports (IFR) were regularly submitted, and were found to be of acceptable quality according to the Bank standards. The project accounts were audited by external auditors annually, and the audited financial statements were unqualified (ICR, paragraph 66). However, the issue of payment



of IDA credit expenditures from Governments accounts was flagged twice as a problem. To address this issue, the FBiH PIU was advised to balance the payments from various sources of funding to be in line with the relevant credit agreement.

Procurement. According to the ICR (paragraph 65) "both implementation units had adequate procurement management arrangements for the project implementation, and each hired a fulltime procurement officer with adequate experience in World Bank procurement procedures." The ICR provided mixed messaging on procurement because on one hand it stated that there were delays in the procurement of consultancies for the preparation of detailed engineering designs of pressurized irrigation systems (ICR, paragraph 53), but on the other hand it stated that there were no implementation delays due to procurement-related issues (paragraph 65). The last procurement post-review revealed a few minor irregularities concerning some documents that were not dated accurately. These were brought to the attention of the respective PIUs (ICR, paragraph 65).

c. Unintended impacts (Positive or Negative)

The ICR did not provide information on this topic.

d. Other

11. Ratings

| Ratings | ICR | IEG | Reason for Disagreements/Comment |
|------------------|-------------------------|-------------------------|---|
| Outcome | Satisfactory | Satisfactory | |
| Bank Performance | Moderately Satisfactory | Moderately Satisfactory | |
| Quality of M&E | Substantial | Modest | M&E design shortcomings and failure to rectify them despite two restructurings. |
| Quality of ICR | --- | Substantial | |

12. Lessons

The ICR included six lessons. The following three are emphasized with some adaptation of language:



- **The design of irrigation projects needs to include on-farm improvements, such as tertiary systems, to ensure delivery of irrigation services to farmers.** The project financed the construction of the network up to the farm gate (main systems), leaving on-farm improvement works for the cantons/municipalities and the farmers to complete, which delayed the start of scheme operations. The lesson is that in order not to delay improved irrigation services to the beneficiaries it is advisable to concurrently implement both the main infrastructure and tertiary on irrigation improvements irrespective of financing arrangements
- **There is need for a policy or master plan to guide investments in agricultural water management.** The project experience showed that implementation issues arose due to lack of a coherent vision for agricultural water management in both FBiH and RS. The lesson is that there is need for an investment strategy or policy vision document that will guide implementation of the next generation of irrigation investments.
- **To ensure local buy-in, local partnerships need to be built into the implementation arrangements.** In order to solve the potential causes of project implementation delays (mainly in FBiH), the national implementation teams engaged directly with mayors and municipalities. Roundtable discussions and clear communications and agreements on mutual expectations and responsibilities with frequent follow up, accelerated the issue of work permits, co-financing was mobilized, location of absentee farmers were identified and all social safeguards issues were resolved. The lesson is that these partnerships and discussions resulted in rapid progress on the rehabilitation of the irrigation schemes/systems.

13. Assessment Recommended?

Yes

Please Explain

An assessment would investigate the extent to which irrigation infrastructure and the capacity of water users' associations were improved to support increased yields for major crops on irrigation farms in the project area and the impact on farm incomes.

14. Comments on Quality of ICR

Quality of Evidence. M&E design had considerable shortcomings, and there were implementation delays that prevented the collection of data on some schemes.

Quality of Analysis. The ICR did not provide clear linkages between the project's activities and results because of the lack of evidence. The evidence reported on the improvement in the performance of the irrigation systems and institutions to support agricultural producers in the project area was very limited. Evidence of the project's performance was almost always based on assumptions and not measured facts even though four of



the schemes in the project had been functional for several years. In addition, the ex post analysis could have benefited from the inclusion of a sensitivity analysis since the analysis of efficiency was based on assumptions and actual results.

Lessons. Lessons reflected the project experience and were well based on evidence and analysis.

Results Orientation. The ICR included a limited discussion on the two elements of the PDO due to limited real evidence.

Internal Consistency. Various parts of the ICR were internally consistent and logically linked and integrated. On the other hand, as mentioned in Section 4 of this review, the ICR was not consistent its text on the extent to which farmers had received support for investing in on-farm structures and equipment to improve water management in the tertiary irrigation system.

Consistency with guidelines. The ICR used the available data-to the extent possible to justify the assigned ratings. Discussion of outcomes was thorough, and the efficiency analysis was reasonable where some assumptions were appropriate given that the rehabilitation/reconstruction activities in more than half of the schemes in the project areas were not concluded until shortly before the project closed .

Conciseness. The ICR provided an adequate coverage of the implementation experience and reported on shortcomings. The outputs in Annex 1 lacked targets, and the ICR could have discussed whether the recommended risk mitigation measures worked. Also, the sections on M&E implementation and utilization could have benefited from more details. Finally, the ICR did not include an explicit statement on the project's compliance with the Bank's safeguard policies.

Overall, the Quality of the ICR is rated Substantial but marginally so.

a. Quality of ICR Rating
Substantial