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The World Bank

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Report No: ICR00004063

IMPLEMENTATION COMPLETION AND RESULTS REPORT

(TF-55265, TF-99534, TF-11422, TF-15208)

ON

GLOBAL ENVIRONMENT FACILITY, SIDA, EC IPA, AND FS-7SD GRANTS

IN THE AMOUNT OF EURO 18.5 MILLION

(US$22.8 MILLION EQUIVALENT)

TO

BOSNIA AND HERZEGOVINA

FOR THE

WATER QUALITY PROTECTION PROJECT (P085112)

June 20, 2018

Water Global Practice
Europe And Central Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective March 31, 2018)

Currency Unit =	Bosnian Convertible Marka (BAM)
BAM 1.59 =	US$1
US$0.708254 =	SDR 1

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ABBREVIATIONS AND ACRONYMS

BiH	Bosnia and Herzegovina
BOD	Biochemical Oxygen Demand
CAS	Country Assistant Strategy
CHP	Combined Heat and Power
CPS	Country Partnership Strategy
EBRD	European Bank for Reconstruction and Development
EC IPA	European Commission Instrument for Pre-Accession Assistance
EMP	Environmental Management Plan
EU	European Union
GEF	Global Environment Facility
GEF-OP	Global Environment Facility - Operational Programs
ICR	Implementation Completion Results Report
IF	Investment Fund
M&E	Monitoring and Evaluation
N&P	Nitrogen and Phosphorous
NEAP	National Environmental Action Plan
O&M	Operation and Maintenance
PAD	Project Appraisal Document
PDO	Project Development Objective
PIU	Project Implementation Unit
PMU	Project Management Unit
SAPs	Strategic Action Programs
SIDA	Swedish International Development Agency
TA	Technical Assistance
TF	Trust Fund
VAT	Value Added Tax
WB	World Bank
WIP	Wastewater Improvement Plan
WIS	Water Information System
WQPP	Water Quality Protection Project
WWTP	Waste Water Treatment Plant

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P085112	QUALITY PROTECT (GEF)
Country	**Financing Instrument**
Bosnia and Herzegovina	Specific Investment Loan
Original EA Category	**Revised EA Category**
Partial Assessment (B)	Partial Assessment (B)

Organizations

Borrower	Implementing Agency
Federal Ministry of Finance	Ministry of Agriculture, Water Management and Foresty

Project Development Objective (PDO)

Original PDO

The project development objective is to further strengthen the capacity of local utilities and reduce pollution from municipal sources into the Neretva and Bosna Rivers. The global objective is to reduce municipal pollution and nutrients in the Adriatic Sea and the Danube Basin. The sub-objectives are: (i) develop the Wastewater Improvement Plan; (ii) further strengthen the Joint BiH/Croatian Working group, with coordination from Serbia and Montenegro to implement the Wastewater Improvement Plan; (iii) develop and implement high-priority, low-cost water capital investments; and (iv) disseminate information in BiH and the region for replication of project activities at other priority sites in the Balkans.

FINANCING

	Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing			
TF-55265	8,900,000	8,747,145	8,747,145
TF-99534	5,667,147	5,629,840	5,629,840
TF-11422	1,764,832	1,911,034	1,830,569
TF-15208	6,432,218	5,072,179	5,227,588
Total	**22,764,197**	**21,360,198**	**21,435,142**
Non-World Bank Financing			
Borrower	6,190,000	4,200,000	4,200,000
SPAIN, Govt. of	1,180,000	0	0
Total	**7,370,000**	**4,200,000**	**4,200,000**
Total Project Cost	**30,134,197**	**25,560,199**	**25,635,142**

KEY DATES

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
07-Jun-2005	18-Nov-2005	25-Oct-2010	30-Jun-2014	30-Dec-2016

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$M)	Key Revisions
09-Dec-2010	4.29	Change in Loan Closing Date(s) Reallocation between Disbursement Categories
20-Jul-2011	5.47	Additional Financing
14-Mar-2012	5.73	Additional Financing
29-Mar-2012	5.73	Change in Loan Closing Date(s)
11-Dec-2012	6.75	Additional Financing Change in Loan Closing Date(s)
30-Jul-2013	6.92	Change in Loan Closing Date(s)
28-Nov-2013	7.01	Additional Financing
30-Jun-2015	8.60	Change in Loan Closing Date(s)
26-Feb-2016	8.72	Change in Loan Closing Date(s) Reallocation between Disbursement Categories
16-Nov-2016	8.86	Change in Loan Closing Date(s) Change in Safeguard Policies Triggered

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Moderately Unsatisfactory	Moderately Unsatisfactory	Modest

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$M)
01	21-Jun-2006	Satisfactory	Satisfactory	.40
02	12-Oct-2006	Satisfactory	Satisfactory	.40
03	26-Dec-2007	Satisfactory	Moderately Unsatisfactory	.44
04	21-May-2008	Satisfactory	Satisfactory	.44
05	01-Feb-2009	Satisfactory	Moderately Satisfactory	.46
06	18-Nov-2009	Satisfactory	Moderately Unsatisfactory	1.79
07	22-Mar-2010	Satisfactory	Moderately Unsatisfactory	2.56
08	01-Nov-2010	Satisfactory	Moderately Satisfactory	4.29

09	25-Jun-2011	Satisfactory	Moderately Satisfactory	5.47
10	01-Jan-2012	Satisfactory	Moderately Satisfactory	5.59
11	13-Jun-2012	Satisfactory	Satisfactory	5.93
12	26-Dec-2012	Satisfactory	Satisfactory	6.75
13	08-Dec-2013	Satisfactory	Satisfactory	7.01
14	29-Jun-2014	Satisfactory	Moderately Satisfactory	7.22
15	22-Dec-2014	Satisfactory	Moderately Satisfactory	7.74
16	15-Jun-2015	Satisfactory	Moderately Satisfactory	15.46
17	31-Dec-2015	Moderately Satisfactory	Moderately Satisfactory	15.58
18	15-Jun-2016	Moderately Satisfactory	Moderately Satisfactory	18.04
19	23-Dec-2016	Moderately Unsatisfactory	Moderately Satisfactory	20.58

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Water, Sanitation and Waste Management	**100**
Sanitation	100

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)
Environment and Natural Resource Management	**100**
Environmental Health and Pollution Management	100
Air quality management	33
Water Pollution	34
Soil Pollution	33

ADM STAFF		
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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. The Bosnia and Herzegovina (BiH) Water Quality Protection Project (WQPP) was developed and established to: (i) address the environmental degradation of two major rivers of Neretva (Mediterranean Basin) and Bosna (Danube/Black Sea Basin); (ii) develop a Wastewater Improvement Plan (WIP) for BiH; (iii) coordinate regional priorities, primarily with neighboring Croatia, Montenegro, and Serbia; (iv) build a network of institutions needed for effective wastewater treatment; and (v) prepare the groundwork for innovative low-cost wastewater treatment methods.

2. The WQPP was identified and agreed upon the *Country Assistance Strategy* (CAS) for financial years 2005–2007 (Report 29196-BA) and its pillar three: *Investing in Key Social and Economic Infrastructure, that stressed the importance of developing and maintaining urban infrastructure*. As of 2005, only four percent of the country had access to sewerage services. The *BiH National Environmental Action Plan* (NEAP, 2003) also called for wastewater management as an important issue: *"Most of wastewater (90 percent) is released directly without treatment into nearby rivers, streams, and underground channels. … and pollution from municipal sources is disproportionally high*." The WQPP was also seen a reconciliation tool for then divided communities to join forces in economic development and environment protection.

3. **The WQPP was consistent with the objectives of the Global Environment Facility (GEF) Operational Programs and the frameworks of two GEF Strategic Partnerships**[1], the GEF Black Sea/Danube Strategic Partnership and the GEF Strategic Partnership for the Mediterranean Large Marine Ecosystem.

4. The key analytical basis for project preparation was provided by the NEAP and the United States Trade and Development Agency (USTDA)-funded study on low-cost schemes to protect the Neretva River (January 2004). The Project was designed in parallel to implement the *Mostar Water Supply and Sanitation Project (P057951)* that initiated rehabilitation of the sewerage systems of the city of Mostar. In addition, the WQPP activities were consistent with the *BiH-Croatia Integrated Ecosystem Management of the Neretva and Trebišjinica Rivers Project* (BTRP, P084608) to protect deltas of both rivers shared between Croatia and BiH, which flow into the Adriatic Sea. It was envisaged that these two projects would strengthen joint river management and cooperation, and help balance competing demands for water use in the Mediterranean and Black Sea-Danube Basins. Furthermore, during preparation, the WQPP benefited from the experience of previous World Bank projects in BiH such as the *Urban Infrastructure and Service Delivery Project* (P083353, Credit No.3954-BA) and the *First and Second Solid Waste Management Project (*P057950; Credit Nos. 3672-BA and 3672-1-BA; Loan No. 7629-BA). The WQPP was, in its order, one of the foundations of the Municipal Development Project, then the *Sarajevo Wastewater Project (P0*90675) that was approved in 2009.

5. The WQPP was financed by a set of grants from GEF, IDA, and BiH developing partners through the Federation Ministry of Finance to according agencies and utilities. There was no formal lending component to this set of grants at any stage of the WQPP implementation. The Government of BiH obligations were limited to

[1] See Annex 5 for details on the GEF Partnerships.

value added tax (VAT) payments, 20 percent of cost category Works and covering cost of the possible resettlement. At the approval stage, the WQPP envisaged financing of the project activities according to table 1.

Table 1. WQPP Financing

	Original Amount (US$) At Approval – June 2005	Revised Amount (US$) 2010	Actual Disbursed (US$) At Project Closure
World Bank Financing			
TF-55265	8,900,000	8,747,145	8,747,145
Global Environment Associated IDA Fund	4,000,000	0	0
TF-11422	0	1,764,832	1,830,569
TF-15208	0	6,432,218	5,227,588
Total	**12,900,000**	**22,611,342**	**21,435,142**
Non-World Bank Financing			
Borrower	6,190,000	4,200,000	4,200,000
SPAIN, Govt. of	1,180,000	0	0
Total	**7,370,000**	**4,200,000**	**4,200,000**
Total Project Cost	**20,270,000**	**26,811,342**	**25,635,142**

6. According to the GEF requirements for co-financing, the WQPP was considered as being contributed by the two then ongoing World Bank projects, Mostar Water Supply and Sanitation Project (P057951) and BiH Urban Infrastructure and Service Delivery Project (P083353). Each of the mentioned projects expected in-kind contribution in the amount of US$1 million to benefit the WQPP's development objectives. These contributions were expected to facilitate rehabilitation of connections to existing wastewater systems that were damaged during the war to guarantee wastewater flow into the WQPP wastewater treatment plants (WWTPs). While both projects were completed in 2005 and 2011, respectively, they had only limited investments related to the expansion of specifically the wastewater network and connecting new customers in cities covered by the WQPP.[2]

7. The model and modalities developed for the WQPP were expected to attract additional funding and investment support by other donors, but this was not so by the WQPP start. From the time WQPP was approved and declared effective in 2005, and despite the WQPP team efforts, no grant resources to the WQPP account were provided by prospective donors and IDA until FY11. At the same time, the BiH Government was co-financing the ongoing activities, as appropriate. As of June 30, 2010, the project financial gap remained US$11 million.

8. In 2011, the BiH Government received financial assistance of about US$5.7 million from the Swedish International Development Cooperation Agency (SIDA) for construction of the Mostar WWTP, connecting it to a

[2] Report 34620. Implementation Completion and Results Report (IDA-34000 TF-25712) and ICR 1936, Implementation Completion and Results Framework Report (IDA-39540 IDA-39541).

central wastewater collection system in Mostar, and for the Živinice WWTP rehabilitation (TF-99534), which contributed to close the WQPP financing gap.

9. Since 2003, BiH has been recognized by the European Union (EU) as a 'potential candidate country' for accession since the decision of the EU Council in Thessaloniki. Upon signing the bilateral *Stabilisation and Association Process* Agreement in 2008, the country became eligible for the European Commission Instrument for Pre-Accession Assistance (EC IPA). Later in 2012, EC IPA financial resources were obtained in the amount of EUR 1.399 million for completion, rehabilitation, and commissioning of the Živinice WWTP (TF-11422). And finally, in 2014, the EC IPA provided an additional US$6.4 million for the completion of the secondary wastewater treatment process at the Mostar WWTP (TF-15208). The last grant fully covered the remaining part of the WQPP financing gap. Table 2 presents the financing inputs as of December 31, 2016, the WQPP closing date. It is important to note that SIDA and EC IPA grants had been exempt from VAT, thus reducing the BiH contribution.

Table 2. WQPP Financing Inputs

Financing Party	GEF	EC IPA	SIDA	BiH counterpart Financing*	Total
Financing, US$ 000	8,900	8,197	5,629	4,200	**27,260**
In %	33	30	21	17	**100**

*BiH agencies and entities provided financial support in the amount of about US$4.2 million to cover land acquisition, VAT for the GEF portion of the grant, 20 percent costs of procurement category Works, and some minor auxiliary WQPP costs, which, however, were not formally accounted for as the WQPP client contribution in the project accounts.

Theory of Change (Results Chain)

10. **Key Activities**. It was expected that the combined financial resources provided by the GEF, IDA, BiH Government, and the BiH development partners would increase the capacities of local utilities and reduce the Neretva and Bosna rivers pollution originating from settlements through investments into wastewater infrastructure in selected municipalities. Additionally, the WQPP financed studies on municipal pollution inventory and developed: (i) a Wastewater Improvement Plan for reducing river pollution (Water Information System [WIS]); (ii) a study of the Biological Monitoring of the Rivers and Lakes/Reservoirs in BiH (BMS); and (iii) a feasibility study on low-cost, natural treatment of wastewater.

11. The WQPP financed the rehabilitation of WWTPs in Trnovo and Odžak, and constructed wastewater mains and wastewater treatment facilities in Mostar and Živinice. During project implementation, by obtaining additional funds from the EC IPA and SIDA, the WQPP could finance the reconstruction of the WWTPs in the municipalities of Trnovo and Odžakm, as well as expand wastewater services to the Trnovo suburb of Turovi and construct two full-scale secondary WWTPs in both Mostar and Živinice, which were not foreseen at the inception of the WQPP in 2005.

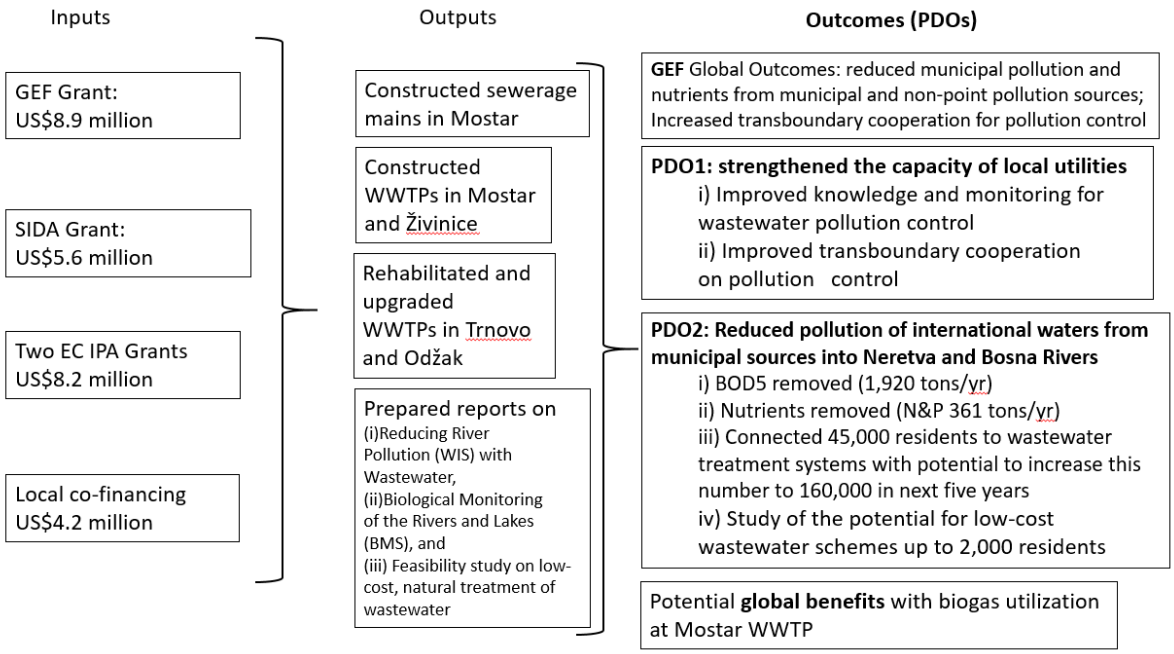
Table 3. Comparison of the WQPP Key Outputs

Activity	Planned activities	Implemented activities
Mostar	First phase of construction, which would consist of construction of sewer mains along the narrow river valley and a low-cost effluent treatment unit	• Constructed 5 km of sewer mains and a full-scale WWTP of 10,000 m^3/day with tertiary treatment including biological treatment, nutrients removal, sludge digestion, biogas generation and Combined Heat and Power (CHP) unit

Activity	Planned activities	Implemented activities
Odžak	Sewerage rehabilitation to a certain extent, discharge pipeline toward river for treated wastewater and sewage water treatment plant	• Rehabilitated WWTP, including biological treatment with sludge management and utilization
Trnovo	Rehabilitation of WWTP	• Rehabilitated WWTP and expanded wastewater services to the Trnovo suburb of Turovi
Živinice	Some of the sewer mains and improve the water treatment plant (if appropriate financing is available)	• Full-scale WWTP with biological treatment and nutrients removal
Water Quality Monitoring	Water Improvement Plan	• Water Information System (WIS) in BiH upgrading and expansion (Component A) • Study on Biological Monitoring on Rivers and Lakes/Reservoirs in BiH (both Component A)
Wetland conservation	A feasibility study for low-cost natural wastewater treatment	• Feasibility study of Using Natural Processes to Treat Municipal Wastewaters of Smaller Cities and Settlements in the Territory of BiH • Conceptual designs of the natural low-cost wastewater treatment designs were developed for three settlements, however not constructed

Note: The Project financed construction of and rehabilitation of four WWTP cumulatively serving 160,000 inhabitants.

Figure 1. Theory of Change



Project Development Objectives (PDOs)

12. The GEF global objective of the Project was to reduce municipal pollution and nutrients from municipal and non-point pollution sources. The overall objective of the Project was to further strengthen the capacity of local utilities and reduce pollution from municipal sources into the Neretva and Bosna Rivers. The sub-objectives

were to: (i) develop the Wastewater Improvement Plan; (ii) further strengthen the Bosnia and Herzegovina-Croatia Commission for Water Management, with coordination from Serbia and Montenegro, to implement the Wastewater Improvement Plan; (iii) develop and implement high-priority, low-cost Investments; and (iv) disseminate information in BiH and the region for replication of Project activities at other priority sites in the Balkans. With WQPP, the World Bank was able to further improve ongoing communication between the neighboring countries, which would need to reach an agreement on origination of water polluters and monitoring and evaluation (M&E) of water quality and expand this cooperation to other neighboring countries.

Key Expected Outcomes and Outcome Indicators

13. The original PDO indicators covered the following as indicated in the main text of the Project Appraisal Document (PAD), Report No. 29832-BA[3]:

(a) Completion of the Wastewater Improvement Plan.

(b) Regional cooperation and replication in the Balkan region.

(c) Reduction of municipal-based pollution.

14. The set of monitoring (physical/technical) indicators and performance indicators (operational and environmental) that would be monitored and reported on timely basis by means of Project Management Reports agreed during project preparation and confirmed during project appraisal include[4]:

(a) Annual reduction of nutrients discharges (P and N kg/year);

(b) Average operation cost of nutrient reduction process (US$/kg of nutrient);

(c) Annual reduction of BOD discharges (tons/year); and

(d) Average operation cost of the BOD reduction (US$/kg of BOD).

15. The additional GEF-specific indicators were included as part of the Results Framework in the PAD. Refer to annex 6 of the ICR.

Components

16. The original approved WQPP had the following components: Action Plan for River Pollution Reduction in BiH (Component A); High-Priority Investments (Component B); Natural Wastewater Treatment study (Component C); Project Management (Component D); and Replication, Information Sharing, and Implementation (Component E).

Component A: River Pollution Reduction in BiH (GEF US$0.45 million)

[3] Original PDO indicators reflected on page 8 under the heading 'Key Indicators'.
[4] Refer to Project Appraisal Document, Report No. 29832-BA, page 8 under the heading 'Key Indicators'.

17. This component was a basis for all further actions regarding a Wastewater Improvement Plan (WIP) for river pollution reduction. It would comprise the following activities:

a. Data collection:

i. Analyzing existing laws and regulations on wastewater discharge into different water regimes;

ii. Describing existing institutional arrangements;

iii. Determining river course regimes and pollution levels;

iv. Identifying polluters and pollution levels; and

v. Establishing required pollution reduction measures and costs.

b. Data review and plan development:

(i) Reviewing all collected data;

(ii) Developing a phased nutrient reduction plan in accordance with priorities, with a view of maintaining adequate basin water quality and estimating costs;

(iii) Developing a long-term river water quality monitoring program;

(iv) Developing a financial plan;

(v) Analyzing economic benefits from clean rivers; and

(vi) Proposing necessary institutional improvements, including coordination with riparian countries.

18. **Component B: High-Priority Investments (Total: US$15.55 million; of which GEF US$6.04 million)**

a. **Mostar (Neretva River), 100,000 inhabitants.** Mostar is the biggest polluter of the Neretva River. It discharges its entire untreated sewage directly into the river. It was expected that the project would finance the first phase of construction of a wastewater management system, which would consist of construction of sewer mains along the narrow river valley and an effluent treatment unit.

b. **Živinice (Spreča River) 45,000 inhabitants.** Živinice discharged untreated sewage into the Spreča River, which flows into the Modrac Lake. This lake is the most important source of water for the entire Tuzla region. It was expected that the project would finance some of the sewer mains and upgrade the WWTP, if financial resources were available.

c. **Trnovo (Željeznica River) 2,200 inhabitants.** Rehabilitation of the Trnovo WWTP was a high priority. It was expected that the project would finance the rehabilitation of this treatment plant.

d. **Odžak (Bosna River) 10,000 inhabitants.** The WWTP needed to be rehabilitated. Because there is flat land near the river that can be used for these purposes, the lagoon biological treatment feasibility would be investigated. The project would finance sewerage rehabilitation to a certain extent, discharge pipeline toward the river for treated wastewater, and a sewage water treatment plant.

Component C: Natural Wastewater Treatment (Total: US$1.48 million; of which GEF: US$1.28 million)

19. The WQPP would focus on wetland areas of the lower reaches of the Neretva River in Čapljina and Stolac municipalities, and potentially the area of the lower reaches of the Bosna River – Odžak Municipality (covered by Component B) and, if additional funding was secured, Domaljevac – Šamac Municipality. A feasibility study on Low-Cost Natural Wastewater Treatment was to be developed, considering conditions such as climate, hydrogeological conditions (sensitive karst area) and land management. The study would help in demonstrating relevant low-cost and low-energy treatment investments for smaller cities and municipalities. The long-term plan was to replicate this approach in other parts of BiH.

Component D: Project Management (US$0.31 million)

20. This component included project management, project monitoring, and training for utilities and local governments on project implementation. It also included following up on the Water Law that was at the time being developed with the assistance of the EU and which was planned for adoption by the Government in 2005. No GEF funds were allocated for this component.

Component E: Replication, Information Sharing, and Implementation (Total: US$0.75 million; of which GEF: US$0.45)

21. This would fund financial management training aimed at institutional strengthening and capacity building of utilities, and development of an annual business plan for each utility. This component would also finance replication of the project findings in the region. Specifically, Action Plan monitoring, updating and implementation, coordination with water utilities and international partners (from Croatia, Serbia, and Montenegro) through meetings held every two years, implementation progress reports reviews, social and economic assessments, environmental monitoring information, and lessons learned during project implementation. This would then be followed by recommendations on the measures that need to be adopted to factor in the characteristics of other geographic locations. The major part of the technical assistance (TA) would focus on those aspects that are a hindrance to replication. The lessons learned would be disseminated at a regional, national, or international workshop for design institutes and water utilities. This would also include a public awareness-raising campaign to increase the understanding of the project investments and strategic actions

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)

Revised PDOs and Outcome Targets

22. The PDO was not revised. However, the project was restructured and extended six times. There were changes to the WQPP PDO outcome indicators, intermediate indicators, and targets included and realigned, to strengthen the Results Framework as summarized in Annex 6, table 6.1. The additional finance from SIDA and

the EC IPA allowed completion of the construction and rehabilitation of wastewater treatment facilities, thus making it possible to achieve and even exceed the WQPP targets. The following paragraphs detail the project restructurings in chronological order.

23. **Restructuring, first extension (Report No: 58531-BA, December 2010).** This 18-month extension from February 28, 2011, to August 28, 2012, was requested by the Ministry of Finance and Treasury of BiH on November 12, 2010. This was for the implementation and completion of two sub-projects, disbursement of the recently approved EU and SIDA trust funds, and achievement of the PDO (see paragraph 11 of this ICR). Simultaneously, a separate restructuring memo reallocated US$1.6 million from the Works and Goods categories to Consulting Services from the GEF portion of the WQPP to cover costs of the consulting services of Category C and for design works. The total Consulting Service category was amended to US$2.5 million.

24. **SIDA Grant (TF-099532, July 2011).** SIDA provided US$3,455,747 for construction and provision of goods (including equipment) for the first phase of the Mostar WWTP. This included an inlet lifting station; screening facilities and an outlet; and structure, civil, mechanical, and electrical works as defined for the first phase of construction, including a transformer for power supply, thus expanding the Mostar subcomponent of Component B to construction of a full-scale WWTP.

25. **Restructuring, second extension (Report 67225-BA, March 2012).** The closing date for the WQPP was extended for the second time from August 28, 2012, to August 28, 2013, to allow for the completion of activities. No other restructuring steps were taken at this extension.

26. **EC IPA Grant (TF-011422, March 2012).** The EC IPA provided US$1,399,000 initial grant for the Živinice WWTP subcomponent with construction of the first phase of the WWTP, including an inlet pumping station with a coarse and fine screening facility, aerated grit chamber, aeration tanks, final settling tank, sludge pumping station, sludge drying beds, and effluent measuring, expanding the subcomponent to mechanical and biological treatment of the municipal wastewater flow from Živinice.

27. **EC IPA Grant additional contribution (TF-011422, December 2012).** The EC IPA Grant was extended to finance completion of the secondary treatment at the Mostar WWTP.

28. **Additional financing, restructuring, and third extension (Report 73267-BA, December 2012/July 2013).** The third extension from August 2013 to August 2015 was needed because in December 2012, the World Bank finally signed the Administration Agreement with the European Commission for additional financing of US$6.5 million from the “EC IPA 2010” allocation to BiH (the reason for extension 1), and an amendment that was also signed to the SIDA Administration Agreement for a then negotiated additional contribution of US$2.5 million. The total increase in supplemental funding was US$8.0 million, that fully substituted financial resources that were committed by the BiH Government and other bilateral donors, thus closing the WQPP financing gap. All those resources were committed to the completion of the Mostar and Živinice WWTPs. This financing was fully consistent with the PDO and the provisions of the original PAD, and no changes were proposed to the PDO. Specifically, for Mostar, the original GEF project called for a first stage construction consisting of a sewage main collector and an effluent treatment unit. The successful rehabilitation of the Trnovo, Odžak plants and Živinice WWTPs and the significant reduction in pollution at these sites convinced the EC and SIDA to finance a full treatment plant (preliminary, primary, secondary, and tertiary, as well as sludge treatment) in Mostar. On December 3, 2012, a US$3.5 million grant was signed with SIDA for the Mostar WWTP, bringing SIDA’s total contribution to US$5.7 million. The SIDA-financed TF-099532 went into effect in November 2013.

29. With this restructuring, the WQPP Results Framework was amended,[5] and the following indicators were added: (i) setting wastewater effluent targets for each of the WWTPs; (ii) volume (mass) of biochemical oxygen demand (BOD) pollution load removed by treatment plant under the project; (iii) increased quality of the financial management at the utility level; (iv) total number of beneficiaries' indicator for WQPP; and (v) number of female beneficiaries. It was assessed that 100,000 residents would have connection to wastewater services and wastewater treatment, of which 55,000 would be women. In a spirit of GEF incremental assistance to BiH, this amendment also put a target of "40 percent of total BiH population is connected to public sewage and 5.5 percent of municipal wastewater is treated and discharged according to existing standards," reflecting achievements of the separate Sarajevo Waste Water Project. The latter was outside of the WQPP scope, however, still relevant to the reduction of point source pollution. The same extension reported financial training to the utilities, including increasing the wastewater treatment fees for utilities' customers.

30. **Restructuring, fourth extension (Report No: RES19084, June 2015).** This restructuring extended the WQPP and associated trust funds' closing date by six months. The extension would enable the completion of implementation works and commissioning of the Mostar WWTP, which was required to achieve the PDO indicators. This also would allocate time to address the World Bank OP 4.12 to resolve a dispute over land ownership between a Mostar water and wastewater company and 35 individuals. By that time the first EC IPA TF-11422 was closed.

31. **Restructuring, fifth extension (Report No: RES22341, February 2016).** This was requested due to extension of the project closing date, and the reallocation of proceeds among categories was warranted under TF-55265. Reallocation from goods category to consultancy was required, to cover the extra cost of construction supervision and audits, and from works to incremental operating cost category to cover the cost of implementation during the extension period. The Consulting Services category was increased by US$700,00 to US$3.4 million. Simultaneously, the restructuring increased the Incremental Operation Costs by US$50,000 to US$250,000.

32. **Restructuring, sixth extension (Report No. RES25282, November 2016).** This restructuring extended the WQPP closing date until December 2016 to finish construction works and complete payments.

33. **Restructuring request for seventh extension (Requested, December 2016).** This was not granted despite the request from Mr. Ljubo Bešlić, the Mayor of Mostar, as all the works were completed at the Mostar WWTP and the connection of the WWTP to the wastewater network, which was still under completion, was outside the WQPP's purview. Instead the World Bank agreed to delay the delivery date of the Implementation Completion Results Report (ICR) until June 30, 2018, to allow for the works to be completed and the Mostar WWTP to start operating.

Revised PDO Indicators

34. The PDO indicators were changed during the December 2012 and July 2013 restructurings, as indicated in paragraph 28 above. For further details, refer to annex 6 that outlines the changes made.

35. The added indicators included the total number of beneficiaries in the towns with wastewater services and wastewater treatment or 100,000 residents for the four municipalities, of which 55,000 are women. For each

[5] Refer to table 6.1 in annex 6 illustrating the evolution of the indicators and targets of the project and achievements.

WWTP, a set of specific goals with the treatment targets for the wastewater quality effluents, including total N, P, and BOD5, was added.

Revised Components

36. The following amendments were done during the project implementation:

37. **Component A. Amendment of the studies scope (2006).** An EU-funded Water Quality Management (WQM) Project, under implementation from 2005 to 2009, included development of a Water Protection Plan, with defined instruments and measures required to improve surface water quality in BiH. In terms of its contents and design, this study was similar to the envisaged Wastewater Improvement Plan/River Pollution Reduction Plan (WIP). To prevent duplication of activities, water sector representatives in BiH proposed changes to Component A that were agreed with the World Bank and adjusted for two reports:

a. Existing Water Information System (WIS) in BiH upgrading; and

b. Study on Biological Monitoring on Rivers and Lakes/Reservoirs in BiH.

38. Both reports were submitted to the client and were then presented at specially convened national and regional conferences.

39. **Component B.** With the financing from SIDA and EC IPA, the WQPP expanded basic wastewater collection operation and primary treatment processes originally envisaged under the project to full-scale wastewater treatment operations with mechanical and biological treatment.

(a) In Mostar, a full-scale tertiary WWTP was constructed.

(b) In Živinice, the municipality financed rehabilitation of a sewerage network, and all the WQPP finances were directed to construction of the full-scale WWTP with enhanced nutrient removal.

(c) In Trnovo, the WQPP financed extension of the wastewater services to Turovi suburb, thus adding another 1,000 customers to the wastewater collection and treatment systems.

(d) In Odžak, there were no lagoon treatment feasibilities studies due to land unavailability. Instead all finances were spent on the rehabilitation of its WWTP.

40. **Component E** financial resources were used to provide resources for training on financial management and increasing the wastewater treatment fee for participating utilities

Other Changes

41. When obtaining grants to construct the Mostar WWTP, the municipality of Mostar undertook an obligation to complete the wastewater collection network for the city. It was expected that the wastewater mains, when constructed, will provide enough wastewater to cover designed capacity of the Mostar WWTP under construction. This arrangement, however, resulted in additional delays of the WQPP. In January 2015, the municipality of Mostar awarded two contracts to extend the city wastewater network for 3.1 km to loop the

wastewater collection system on the right bank of the city. Later, in December 2016, another contract was signed to design and construct sewer pipelines, tunnels, and inverted siphons. This third contract, financed by the European Investment Bank and an EC IPA grant, was under implementation in 2018 and had to bring wastewater from the left bank's part of Mostar situated at the confluence of the Neretva and Radobolja Rivers.

42. Component D had no GEF allocation and thus did not finance Project Implementation Unit (PIU) operations. All local staff were not paid from the WQPP proceeds and were working on the project part-time in addition to their main functions at the Bosna and Neretva water authorities. No disbursement was made from this component throughout the entire project.

Rationale for Changes and Their Implication on the Original Theory of Change

43. Changes to Component A prevented duplication of activities with other donors and thus saved some financial resources that were used on other activities under the project without compromising its objectives and outputs.

44. Component B changes allowed the construction of WWTPs with biological treatment and nutrient removal processes in Mostar and Živinice, as well as extended the wastewater collection system in Trnovo. This improved the processes at the WWTPs and allowed significantly more pollution reduction in municipal wastewater. Thus, it helped with country compliance and implementation of the EU Wastewater Directive for BiH (*EU acquis communautaire*). Redirection of all funds to build the WWTPs allowed construction to be completed with the available resources.

45. Component C planned piloting the low-cost natural schemes. The Odžak pilot was excluded due to unavailability of land. While such feasibility studies were developed for three villages, the WQPP did not further construct such schemes. The replication plan was prepared and presented to the Government in 2010.

46. Component E changes included financial training for wastewater treatment processes. All participating utilities received financial management and tariff setting training for wastewater treatment services.

47. The Project Management Unit (PMU) that was to be financed by Component D was not explicitly financed during the life of the WQPP. The PMU staff was working for the WQPP on a part-time basis without additional remuneration.

II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

Relevance of PDOs - High

48. The WQPP is consistent with the GEF focal program International Waters, as it was fostering transboundary cooperation and building trust between states (Croatia, Montenegro, and Serbia), helping to unlock a complex and long-lasting marine resource and/or freshwater-use conflicts. It also helped BiH jointly with

its neighbors, manage the transboundary surface water basins of the Danube Basin and Adriatic Sea and their coastal and marine systems.

49. At the time of the WQPP approval, the project was also consistent with the then objectives of GEF Operational Programs (GEF-OP) No. 2 Coastal, Marine, and Freshwater Ecosystems; GEF-OP No. 8, Waterbody Based Operational Program, both focused "on seriously threatened water-bodies and the most important transboundary threats to their ecosystems." The WQPP was in compliance with GEF-OP No. 9 Integrated Land and Water Multiple Focal Area; No. 10 Contaminated-Based and GEF-OP No. 12 'Integrated Land and Water Multiple Focal Areas Operations Program' which called to halt environmental degradation and introduce nature-friendly treatment processes of the municipal pollutants.

50. The PDOs of the project are aligned with the current Country Partnership Framework for BiH for 2015–2018 (Report No. 99616-BA, November 15, 2015) and specifically its Pillar III - Environmental Sustainability: ensure a sustainable use of natural resources, such as water and forestry, which are key to economic growth in BiH, and adapt to climate change and promote the sustainable development of basic municipal services.

51. At the time of appraisal, the project's objectives were also consistent with the country's development priorities and the World Bank's Country Assistance Strategy (CAS) for BiH (Report No: 29196-BA), which stresses the importance of developing and maintaining infrastructure. The CAS confirmed that only about 40 percent of the urban population had access to sewerage services. The challenges cited relate to improving water pollution control and conservation of wetlands. In addition, the estimated limit on private and public external borrowing for investment purposes over the period constitutes a critical constraint to bridge the investment financing gap. It was also expected that the GEF project could assist in leveraging funds to reduce pollution of both the Adriatic Sea and the Danube Basin.

52. The subsequent Country Partnership Strategy (Report No. 41330-BA, November 12, 2007), specifically called for "Particular attention needs to be paid to improving: water and wastewater services." Given the situation of the water and wastewater sector and most of the country's utilities, including limited new investments, deteriorating stock of infrastructure, poor operation and maintenance (O&M), and inadequate financial performance of the Sarajevo ViK, the project was to follow the authorities' request to rehabilitate damaged wastewater infrastructure. The CPS for 2008–2011 reconfirmed the need for improving public spending and the delivery of public services for the vulnerable through enhancing delivery of municipal services and strengthening municipal finance. This was achieved through essential rehabilitation and maintenance of the Sarajevo ViK wastewater infrastructure, particularly those that were needed to address critical health and environmental problems posed by limited access to sanitation and pollution of water resources of the Danube River Basin. As mentioned earlier, the project used the experience of previous World Bank projects and studies.

53. BiH is currently on the accession track toward the EU. As part of the accession process, it must soon comply with the EU environmental requirements, including availability of wastewater treatment facilities for all settlements with population equivalent of 10,000. In the next 10–15 years, the sector policy will likely be driven by the EU accession that requires construction and operation of many wastewater treatment facilities, so the experience of the WQPP will be much demanded by municipalities. The annual reports on the EC IPA Country Action Programme for BiH are regularly published and disclosed.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome[6]

54. **PDO1. Further strengthen the capacity of local utilities.** This was mainly achieved through the attainment of the following:

(a) **Sub-Objectives (i) and (ii) - develop the Wastewater Improvement Plan and further strengthen the BiH-Croatia Commission for Water Management**, with coordination from Serbia and Montenegro, to implement the Wastewater Improvement Plan. The BiH Water Information System (WIS) has been fully operational since 2009 for both Neretva and Bosna River Basins at the basin managements in Mostar and Sarajevo, respectively. Moreover, because of the WQPP, the WIS was developed for the entire territory of BiH (even though the Project is defined as solely for Federation of BiH) and has significant benefits in terms of a unified, country-wide approach, facilitating, therefore, water quality protection, reporting requirements of BiH as a country, and the harmonization of BiH legislation with the EU. Training was conducted for the staff of the Ministries of Environment, Water Resources, and Forestry, and manuals for users were prepared and distributed.

(b) **A manual for Biological Monitoring on rivers and lakes/reservoirs in BiH** has been fully operational since its transfer to the client in 2010. The manual was widely circulated and extensively discussed. The final report was presented at the last workshop in Mostar in June 2009 and additional training was held in Bratislava. Also, a study tour to Austria was organized for beneficiaries (agencies and ministries) later in September 2009. The regional cooperation continues with regular exchanges of information on water resources status, pollution control, and development.

55. **PDO2 reduce pollution from municipal sources into the Neretva and Bosna Rivers.** Sub-objective (iii)—develop and implement high-priority, low-cost water capital investments—were implemented through the following:

(a) **The WQPP achieved and overcame Sub-objective (iii) targets** through rehabilitation of the WWTP in Trnovo and Odžak and construction of WWTPs with primary and secondary treatment processes in Mostar and Živinice. In addition, about 5km of wastewater mains were constructed in Mostar. It is expected that the total number of beneficiaries will grow to 160,000 when all works are completed and become operational at the designed capacity. Wastewater quality indicators are all achieved. However, wastewater volumes are still below the expected volume, pending connecting wastewater mains with the WWTPs. The original plan was limited to connecting the wastewater mains to the wastewater treatment facilities and did not include the advanced wastewater treatment. Thus, the WQPP was a mechanism to attract additional funding for the necessary improvements of wastewater systems: with support from SIDA and the EC IPA, the WQPP was able to construct WWTPs with a secondary treatment level at all four sites. The PDO2 *de facto* shifted from reduction of pollution to constructing the wastewater treatment facilities to *sustainably*

[6] Refer to annex 6 that illustrates the evolution of the PDO indicators, targets, and achievements.

reduce pollution, shifting the project paradigm to *supply side* versus original output of the clean water.

(i) **The Trnovo WWTP.** Capacity of the plant is 1,500 m^3 per day. However, the flow is not more than 500 m^3 a day, serving about 1,500 residents and several small industries. Many of its potential customers are still not connected for a variety of reasons. The wastewater collection system combines wastewater and storm water; thus, the wastewater is weak, with average BOD5 content in a range of 40–60 mg per liter, ammonia content 9–11 mg per liter, and phosphorus-eq in a range of 1 mg per liter. The treatment reduces the pollution to the level corresponding to the BiH national standard.

(ii) **The Odžak WWTP** has a standard treatment process with mechanical sedimentation and biological treatment reactor with aeration and collection of the excess sludge stabilization. Its wastewater inflow is substantially below capacity. Even though the incoming wastewater is of poor quality, with just operational mechanical treatment and grit removal it meets the national discharge standard. The plant is designed for about 2,000 m^3 per day, or 20,000 population-equivalent, but currently serves only 5,000 residents and several industries. The utility plans to connect about 10,000 residents to the wastewater system in the next five years.

(iii) **The Živinice WWTP** has two stages of treatment with anoxic removal of nitrogen. Technical parameters of the wastewater treatment fully correspond to the design of reducing BOD5 at inlet from about 75–100 mg per liter to 15 mg per liter, phosphorus from 2.0 mg per liter to nearly 1.0 mg per liter, and nitrogen from 18.0 mg per liter to less than 3.0 mg per liter. The effluent quality now corresponds to the national and EU wastewater treatment regulations. However, since February 2018, Živinice Communalac is undergoing bankruptcy protection procedures and does not have financial resources to purchase iron chloride for the phosphorus chemical precipitation and full operation of its nitrogen removal system. The maximum capacity of the Živinice WWTP is 20,000 m^3 per day of wastewater. However, the current wastewater flow is in the range of 4,000–6,000 m^3 per day. The Živinice WWTP has substantial issues with its operation.

(iv) **The Mostar WWTP** was constructed and tested, commissioning has begun but it is not operational. It is expected to become fully operational later in 2018. During the first year of operation, it will operate at about half of its capacity serving the population at the left bank of the Neretva River. The ongoing municipal project plans to connect the other half of the city in 2019, and then the plant is expected to operate at full capacity. There is still no tariff set for wastewater collection and treatment in Mostar.

(b) **The project financed the study of the potential for low-cost wastewater schemes for the entire country** covering all municipal agglomerations up to 2,000 residents. The study, developed and transferred to the Client in 2010, specified a comprehensive model that allows any interested municipality to develop its natural wastewater scheme based on its geographic and climatic parameters. The project also financed conceptual designs for three settlements, specifically for Velagići-Hadžići in Ključ Municipality, Grborezi in Livno Municipality, and Orahovo in Bosanska Gradiška Municipality.

56. **Sub-objective (iv) Disseminate information in BiH and the region for replication of project activities at other priority sites in the Balkans was successfully implemented.** Multiple training, exchanges, presentations and study tours were conducted during project implementation. Findings from the project were constantly shared among BiH stakeholders and partners, and were also used during the implementation of the *Neretva and Trebisnjica River Basin Management Project - BiH/Croatia (P084608), Sarajevo Wastewater Project (P090675), Croatia Coastal Cities Pollution Control Project 2 (P102732)* and other projects. As for replication, WQPP was the driving force to attract donor funding to the wastewater sector in BiH and in the region. The project proved to be a good mechanism to utilize donors' funds for the wastewater infrastructure needed in the country and proved that there is a significant institutional gap in implementation of the grant programs that could be filled by the WQPP or similar projects. The WQPP was also a learning tool for the Sarajevo Waste Water Project (SWWP, P090675) that had similar issues and was completed with donor funding**.**

57. **The WQPP GEF global objective to reduce municipal pollution and nutrients from municipal and non-point pollution sources** was partly achieved with rehabilitation, construction and operationalization of three WWTPs and construction of the Mostar WWTP that has started commissioning is expected to become operational shortly. Hence, at the closure of the WQPP, more that 11 percent of BiH urban residents were connected to the municipal wastewater collection and treatment system, and the collected sewage is being treated and discharged according to BiH water-environment standards, those corresponding to the EU ones. Considering that the global objective of the product was *to reduce pollution and nutrients in the Adriatic Sea and Danube Basin* (WQPP PAD, page 4) and with operation of the Sarajevo WWTP since May 2016, the global target to collect and treat wastewater coming from 40 percent of the BiH population set in Amendment/Extension Three was also achieved. While the fourth WWTP in Mostar is constructed and tested (2016–2018), it will become operational shortly. However, the WQPP altogether has already contributed to implementation of the GEF partnership programs for both Danube and Mediterranean Seas by triggering construction of the comprehensive wastewater collection system in the country and specifically in Mostar and thus helped with implementation of the international obligations of BiH.

Justification of Overall Efficacy Rating

Rating: Modest

58. Some of the key achievements under the project included development and operationalization of the national WIS; fostering regional cooperation with regular sharing of information on water resources status, pollution control and development, and construction of WWTPs for reduction of municipal-based pollution. Two smallest WWTPs were reconstructed and are now fully operational, and of the two larger ones that were built, the one in Živinice is fully operational. The Mostar WWTP, which is the largest, was completed in 2016 and currently began commissioning but it is not yet operational. The WWTP of the utility in Živinice requires repair after only two years in operation. Table 4 provides the operational status of the WQPP WWTPs.

Table 4. Operational Status of the WQPP Wastewater Treatment Plants

Treatment Plant	Status of Operation	Design Capacity	Actual Usage
Mostar Wastewater Treatment Plant	Constructed and tested, not operational	Full-scale WWTP with tertiary treatment and sludge digestion built (capacity10,000 m^3/day)	Under commissioning Not operational
Živinice Wastewater Treatment Plant	Operational	Full-scale WWTP with biological treatment and nutrients removal 4,000	Operates at 50% capacity, requires major repairs

		m^3/day	
Trnovo Wastewater Treatment Plant	Operational	Secondary WWTP; 500 m^3/day	Operates at 60% of capacity
Odžak Wastewater Treatment Plant	Operational	Secondary WWTP; 2,500 m^3/day	Operates at 60% of capacity, some repair is required

C. EFFICIENCY

59. **The project was implemented for more than a decade.** Several implementation delays related to incomplete financing at the beginning of the project and then synchronizing the WWTP construction with expansion of the wastewater network in Mostar resulted in closing the project before the start and commissioning of its largest WWTP in Mostar.

60. The economic analysis was not developed in the WQPP PAD. The economic benefits can include local benefits for the people living downstream of the WWTPs and international benefits.

61. The efficiency of the investments was assessed based on the incremental cost analysis to the GEF grant portion of the project for removal of nutrients and BOD5. This ICR follows the same methodology based on similar assumptions. The World Bank team used incremental cost analysis (before and after the project) considering both original project outcomes (improving living conditions, using property value increase as a proxy) and additional outcomes related to global benefits with reduction of: (a) nutrients flowing into both the Adriatic Sea and Danube River Basin; and (b) BOD5 reduction due to implementation of the secondary treatment process. Additional global benefits are from the operation of the CHP unit at the Mostar WWTP with heat and electricity replacement. The project benefits are assessed for 30 years since investments became fully operational in the first city of Trnovo from 2012 to 2032. It was also expected that all WWTPs will be operational according to designed capacity until 2022, when the total number of residents connected to the WWTPs will reach 160,000. The total amount of nutrients removed are estimated at the level of 5,100 tons or about 1,500 tons of nitrogen and phosphorous (N&P) a year. The amount of BOD removed will be in the range of 15,000 tons a year. The abatement costs are summarized below in table 5.

Table 5. WQPP Abatement Costs

	Mostar	Odžak	Živinice	Trnovo	Total for the Project
Nutrients removed 2010–2032 (kg)	2,647,746.50	745,434.03	1,455,985.91	148,647.35	4,997,814
Investments in WWTP (US$)	$14,398,895	$2,292,522	$3,043,693	$669,875	$20,404,985
Abatement cost N&P per kg removed (US$)	$5.44	$3.08	$2.09	$4.51	$15.12
BOD5 removed (kg)	140,744,000	39,624,400	77,394,600	7,901,520	265,664,520
Abatement cost per kg of BOD5 removed (US$)	$1.00	$ 0.59	$ 0.42	$ 0.78	0.83

62. The marginal abatement costs for nutrients are substantially higher than what was estimated at appraisal of the WQPP reflecting actual investments at every WWTP and lower than expected wastewater flow (about 50

percent in Odžak, Trnovo, and Živinice and no wastewater treatment yet in Mostar[7]). However, they are close to the international benchmark of US$5[8]. See details in annex 4.

63. Significant issues, however, are with establishing and collecting wastewater tariffs and thus maintaining the financial well-being of utilities that operate constructed and rehabilitated WWTPs. Wastewater tariffs that are set in Trnovo, Živinice, and Odžak are well below the operating costs. In Odžak, the municipality covers electricity costs of the water and wastewater company. In Mostar, there are no tariffs for wastewater services, and the WWTP is yet to be put into operation, partly over financial concerns. The utility in Trnovo gets subsidized by its owner, Sarajevo Water and Wastewater company (Sarajevo ViK), and in Živinice the utility is currently undergoing the bankruptcy process that was initiated on February 4, 2018. In addition, technical maintenance of the utilities also suffers due to financial imbalance. Please see annex 8 for details.

64. **Cost efficiency analysis.** The WQPP was cost efficient as its investments were at par or below similar costs in the West Balkans region. The higher per unit cost for smaller WWTPs is explained by the lower economy of scale of WQPP wastewater treatment operations.

Table 6. Cost-efficiency Comparisons Construction of WWTP

Name of the Project	City	Cost	Unit Cost
Croatia Coastal City Pollution Control Project 2 (World Bank)	Zadar, secondary treatment only	EUR 15.2 million	EUR 70 per m^3 a day of capacity
Zagreb Wastewater Treatment Plant (European Bank for Reconstruction and Development)	Zagreb, tertiary treatment	EUR 274 million	EUR 110 per m^3 a day of capacity
Sarajevo Wastewater Treatment Plant (World Bank)	Sarajevo, tertiary treatment	US$29 million	US$145 per m^3 a day of capacity
Mostar Wastewater Treatment Plant	Mostar, secondary treatment with enhanced effluent treatment and biogas utilization	US$14.4 million	US$143 per m^3 a day of capacity
Živinice Wastewater Treatment Plant	Živinice, secondary treatment with enhanced effluent treatment	US$3.01 million	US$180 per m^3 a day of capacity
Odžak WWTP rehabilitation	Rehabilitation of the WWTP with secondary treatment	US$2.3 million	US$240 per m^3 day of capacity
Trnovo WWTP rehabilitation	Rehabilitation of the WWTP with secondary treatment	US$700,000	US$304 per m^3 day of capacity

[7] For the abatement cost calculation purposes, the Mostar WWTP operations are assumed to start in the second half of 2018.

[8] The figure of US$5 per kg has been adopted based on available references, such as US$2 per kg proposed by G. Constantinides (Cost-Benefit Analysis Case Studies in Eastern Africa for the GPA Strategic Action Plan on Sewage. UNEP, 2000); SEK 62 per kg (US$7.36 per kg) proposed for the marginal benefit of nitrogen reduction proposed by I. M. Gren and H. Folmer (Cooperation vs. Non-Cooperation in Cleaning of an International Water Body with Stochastic Environmental Damage: The Case of the Baltic Sea. Swedish University of Agricultural Sciences, Uppsala, September, 2001); EUR 11.50 per kg as the critical emission 'tax' level for the removal of phosphorous from detergents, as proposed by I. Ijjasz (Reducing Phosphorus in the Danube Basin Workshop, Hungary, 1995); and SEK 47 per kg (US$5.58 per kg) and SEK 112 per kg (US$13.30 per kg) for the marginal cost of reduction of nitrogen and phosphorus to coastal waters as proposed by K. Elofsson (Cost Efficient Reductions of Stochastic Nutrient Loads to the Baltic Sea, Paper presented at the 7th Ulvoe Conference June 19–21, 2000).

Name of the Project	City	Cost	Unit Cost

Assessment of Efficiency and Rating

Rating: Modest

65. Efficiency is rated *Modest*. This is due to the significant delays in project implementation, the slower-than-expected rate of connections of new customers, and the delay in operationalizing the Mostar WWTP. However, if the planned connection of wastewater customers takes place by the end of 2018, as currently planned, and Mostar WWTP starts operating according to the designed capacity, then the WQPP efficiency will be on par with operations of other WWTPs and even exceed them. This will happen as the WWTPs are designed and upgraded with modern advanced technology compared with the one that was proposed for the WQPP at inception in 2003–2004.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

Rating. **Moderately Unsatisfactory**

66. Given the high relevance of objective, modest efficacy, and modest efficiency, the overall rating is Moderately Unsatisfactory.

E. OTHER OUTCOMES AND IMPACTS (IF ANY)

Gender

67. Not applicable.

Institutional Strengthening

68. **Institutional strengthening was significant.** Both Neretva and Bosna River Basin Management offices were empowered with new monitoring tools and strategy instruments for water quality monitoring and management of surface waters. The BiH Government now has an assessment for the potential natural treatment methods for the municipalities with population below 2,000 residents, and three feasibility studies were developed and are ready for implementation.

Mobilizing Private Sector Financing

69. Not applicable.

Poverty Reduction and Shared Prosperity

70. The WQPP significantly contributed to shared prosperity by increasing the living standards of the 50,000 residents now connected to the Mostar and Živinice ViK sewerage systems and their WWTPs. (Before the WQPP, Mostar did not have centralized wastewater services). Nevertheless, only about 50 percent of residents in the WQPP cities are currently connected to wastewater networks and WWTPs.

71. The Project indirectly helped with savings on water treatment of the Sarajevo ViK water intake coming from Trnovo, as uncontrolled discharges from latrines were polluting its water intakes. Additionally, the WQPP

significantly reduced the pollution burden for about 100,000 residents along the Neretva and Bosna Rivers living downstream of the newly built and reconstructed WWTPs. This may allow municipal residents to generate more disposable income that can be spent on education, health, and improvement of living standards not only in BiH but also for inhabitants in neighboring Croatia living along the Bosna River and Neretva Delta. This may contribute to the development of tourism in Mostar, as well as along the Adriatic Sea coast areas near the Neretva Delta.

Other Unintended Outcomes and Impacts

72. None.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

73. The overall driver for the WQPP was initially the interest to move beyond the internal conflict of the 1990s. The reconstruction and new WWTPs had a significant symbolic value to prove the country's unity and ability to operate financial resources and recovery assistance after the conflict of 1992–1995. Subsequently, BiH's interest to join the EU, and associated accession process, became an important driving force.

74. The WQPP focused mainly on construction and rehabilitation of WWTPs. Wastewater collection was originally to be covered under the WQPP but was transferred to municipalities and the WQPP activities were centered on wastewater treatment: WWTPs that were built and reconstructed in all four municipalities. Water supply, wastewater collection, technical operations of the water and wastewater networks, and financial and institutional development of water and wastewater utilities remained outside of the WQPP scope and development objectives. And, while the WQPP had not identified/declared Substantial or High risks in terms of its outcomes throughout the implementation period, the utilities' financial challenges became obvious to the Client at very early stages of the project. Adequate mitigation measures, such as calculation of water tariffs, extending of wastewater mains, analysis of wastewater content, and adjustment to appropriate wastewater technology were not part of the WQPP program. The World Bank team was constantly discussing appropriate tariff issues, however, without significant progress.

75. The project design incorporated lessons learned from previous World Bank involvement in water and sanitation projects in Europe and Central Asia. At the time of project preparation, the World Bank's involvement in water and sanitation projects in transition countries was extensive. Significant attempts were made to incorporate these lessons and take up-front actions to have an enabling environment, including the following:

(a) Securing the commitment of the beneficiaries in all municipalities and the authorities to the Project's financial reform objectives up front, that is, basic decisions on adequate tariffs to be in place before inclusion of utilities staff in negotiations (this, however, was only partially achieved during implementation);

(b) Agreeing on the project cost and O&M on the basis of a realistic assessment of the utilities' ability, financial capacity, and level of tariffs that the authorities considered to be socially acceptable for their constituents;

(c) Having a clear understanding and full agreement with the municipal authorities and the utilities' managers on all elements of the project;

(d) Providing TA to the utilities' to identify, design, and implement mandatory programs on institutional strengthening, facilities rehabilitation, and efficiency improvements (this, however, was only partially achieved during implementation);

(e) Building of a strong project implementation capacity early on through the creation and financing of PMUs[9]; and

(f) Most importantly, implementation of the WQPP started when only just above one-third of financing was available (US$8.9 million of US$20.7 of the WQPP cost estimate).

76. In 2004, the WQPP was screened and classified as category 'A' in accordance with the World Bank's operational policies. A review of potential environmental impacts associated with the investments was carried out during project preparation with the assistance of foreign consultants. This was complemented by a specific Environmental Management Plan (EMP). As the WQPP was not anticipated to have significant negative environmental effects and would not result in any involuntary resettlement or land acquisition because it focused on rehabilitation of the existing networks and facilities, it was downgraded to a Category 'B' at appraisal. It was rightfully anticipated that the WQPP would have a positive environmental impact, as it would result in improved drinking water quality, enhanced quality of wastewater released after treatment, better handling of solid and liquid wastes, reduction in the use of chemicals and improved control of water treatment residuals, and reduced risk of sewage spills.

B. KEY FACTORS DURING IMPLEMENTATION

77. The project was wide in its objectives: from water resource monitoring and management to development of natural wastewater treatment, expansion of wastewater networks, and actual construction of WWTPs. As such it was not hard to coordinate among its different elements as they were only formally within one project.

78. The WQPP was a self-standing GEF project. However, while the GEF portion was not exempt from the VAT payments, both the EC IPA and SIDA grants were VAT exempt. This mismatch created unnecessary burden in accounting and processing of the contracts' bills. VAT was properly paid by the respective municipalities; however, these payments were not reported in the World Bank systems as the Client's contribution and had to be collected separately.

79. The investments in Component B of WQPP design were primarily focused on technical achievements. Financial improvements were considered to a limited extent, focusing on relatively modest financial targets: (a) secured local financial contribution for the mentioned VAT from municipalities; and (b) payment for the land acquisition, if necessary. Despite of the constant pressure from the World Bank team, the municipalities were reluctant to discuss tariff adjustments or tariff reforms through the project referring these to political difficulties until the actual WWTPs were constructed and put into operation.

[9] However, at the onset of the WQPP, the World Bank's project team decided against financing a WQPP PIU from the grants, which significantly affected project implementation.

80. Land acquisition for the Mostar WWTP was appropriately conducted, in full compliance with the national legislation applicable to land acquisition and expropriation, as well as the requirements of the World Bank's Operational Policy OP 4.12 on Involuntary Resettlement. This was competed and published in May 2015 on the World Bank's external website (then InfoShop).

81. Both project preparation and the process of declaring the Project effective were done very quickly, however, without guaranteed financing of the WQPP. The project began its implementation with a significant financing gap. This gap by itself considerably delayed implementation of the Project. Additionally, as the WQPP was based on grants, it did not require commitment fees or other financial tools that could encourage quicker implementation or even cancellation of the funds. The role of the Borrower (technically Grant Recipient) in financing the WQPP was limited to co-financing investment and TA contracts, and not actual investments. The absence of a regular PIU made the WQPP even more difficult. Consequently, this resulted in uneven implementation progress with very small disbursements in some years, and an implementation period exceeding 10 years.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

82. The key output indicator, connecting 40 percent of the BiH population to the wastewater collection and treatment systems, was not directly aligned with the project objectives, as this specific target was set to include other World Bank activities outside of the WQPP scope, covering additional achievements of the Sarajevo Waste Water Project.

83. Other indicators were well defined and although most of the targets and baselines were not clarified in the PAD, the baseline and targets were realistic when restructured. However, by completion of the WQPP, many residents were not connected to the wastewater collection system and the Mostar WWTP, the largest investment contract of the WQPP, was not functional as of May 1, 2018.

M&E Implementation

84. The PMU implemented the data collection and monitoring systems immediately at the beginning of the project. Effective systems were put in place and indicators were systematically monitored by the PMU. It was diligent in data collection and reporting on performance data to the World Bank. The M&E results were appropriately reported in the WQPP Implementation Status and Results Reports.

M&E Utilization

85. The information collected was useful in assessing the progress toward project implementation and informing the client. The Client will continue monitoring the WWTPs' operations, costs and revenues of wastewater operations, and the number of sewerage blockages for years to come after closure of the WQPP. Every WWTP has a laboratory that tests influent and effluent quality on a daily basis and then produces monthly reports.

Justification of Overall Rating of Quality of M&E

Rating: Modest

86. The M&E system was Modest with respect to design and implementation of the monitoring system to track the WQPP results and inform project management and decision making at the utility level.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

87. The WQPP was constantly in compliance with the environmental policy. The WQPP was Category 'A' at preparation, triggering many of the World Bank's operation policies. The project was later downgraded to Category 'B' as having no adverse environmental and social effects. Each WWTP had its own environmental assessment (EA), local environmental impact assessment (EIA) and finally environmental management plans (EMPs) that were all part of construction contracts. There were no significant non-compliances noted over the long period of its implementation.

88. **OP 7.50 - International Waterways**. This World Bank Operation Policy (OP) was triggered because it applies to any water project involving the use or potential pollution of international waterways. The environmental assessment excluded the WQPP from the notification of the riparian states on the following grounds. "This safeguard focuses on resolving issues related to a project's effects on international waterways. However, it specifically exempts from the notification requirement minor additions or alterations to existing schemes that will not adversely change the quantity or quality of water flows to other riparian's. As these investments seek to improve the water quality of the waterways in the region, the project clearly meets this definition" The WQPP got an exception from notification requirement OP 7.50 for Projects on International Waterways on November 14, 2004. This exception was given on the grounds that it has minor additions or alterations to the ongoing scheme; it does not cover works and activities that would exceed the original scheme, change its nature, or so alter or expand its scope and extent as to make it appear a new or different scheme." However, after 2011, the WQPP investments remained neither minor nor within the existing schemes with construction of the WWTPs in Mostar on newly acquired land and in Živinice with construction of the new WWTP.

89. **OP 4.12 - Involuntary Resettlement.** This OP was triggered and strictly followed by the WQPP. It was prompted by the land demand at the construction of the Mostar WWTP. A market was properly valued by a sworn court expert, and compensation was conducted by the Mostar municipality accordingly. The details are available in the project files.

Financial Management

90. The project was constantly in compliance with fiduciary and procurement requirements.

91. The counterpart funding of local costs related to VAT, cost of land acquisition and local co-financing was not accounted for in the Project Portal, however the Client contributed nearly US$4.2 million to cover these costs.

92. The audits were conducted on time. The auditors regularly issued unqualified opinions on the project financial statements. The management recommendation letters never contained any internal controls deficiencies or accounting issues. The auditor's reports and audited financial statements, as well as management recommendation letters, were delivered to the World Bank on time throughout the WQPP.

Procurement

93. Overall internal controls while preparing withdrawal applications was fully adequate at the BiH Federation Ministry of Agriculture. The required supporting documents were in place and properly checked and authorized for payment by the respective staff. The correct disbursement percentage and exchange rate were also used. The procurement performance was mostly satisfactory during implementation with no procurement delays through the project.

C. BANK PERFORMANCE

Rating: Moderately Unsatisfactory

Quality at Entry

94. The WQPP was one of the first interventions in the wastewater sector in BiH. Its activities ranged from the quality of water resources to specific investments in municipal infrastructure. The project, however, was fully aligned with the BiH Government's interests, objectives, and sector needs. All studies were conceptualized and feasibility studies and strategic decisions were developed before effectiveness of the WQPP; thus, the Project was ready for implementation immediately.

95. At the same time, the WQPP was not fully financed at the start. With available resources and co-financing from a variety of BiH constituencies, the project was able to complete reconstruction of Trnovo and Odžak WWTPs and conduct all planned TA activities. Also, nearly US$560,000 was invested in preparation of design for dual main sewers in the central area of Mostar. Since 2006, the World Bank team put in great efforts to find additional resources and fulfill the project investment program. And since 2011, the WQPP received three additional grants (two from SIDA and one from the EC IPA) that helped to complete all planned investments and additionally financed the construction of two WWTPs.

96. The WQPP strategic decision was to delegate financing of the PIU operations to the Client. It was expected that the Client will establish and finance operations of the PIU of the project. While the PIU was established, its staff continued its employment within the BiH Government without additional financing.

Quality of Supervision

97. During project implementation, there were frequent changes of Task Team Leaders that might have hindered an early assessment that the project design and evolution were not addressing the sector's bigger sustainability issue. However, the World Bank team made all efforts to save the WQPP throughout its implementation by conducting regular supervision missions, usually combining WQPP supervision with other BiH projects in the sector. Notwithstanding these challenges, the World Bank implementation support team played a crucial role in obtaining investment grants from SIDA and EC IPA.

98. At the same time, the strong focus on completion of construction of the WWTPs meant that insufficient attention was given to the WQPP sustainability and proper financing of the facilities after completion of construction in Mostar and Živinice. Current tariffs for water and wastewater in all utilities are insufficient to cover O&M costs of wastewater operations, and in Mostar there are no wastewater charges yet.

99. Initially, little focus was given to connection of additional customers to WWTPs in Odžak and Živinice. In both places the load is just above 50 percent of the capacity. In Trnovo, the new wastewater network was developed, however no additional wastewater has reached the WWTP yet. Later, the World Bank team encouraged the Mostar municipality to connect the Mostar areas located on the left bank of the Neretva river to the new WWTP. The construction is expected to be completed in 2019, and this will allow the Mostar WWTP be loaded according to the design capacity.

Justification of Overall Rating of Bank Performance

100. The World Bank's overall performance is rated 'Moderately Unsatisfactory' due to significant shortcomings in quality at entry and failure to address implementation delays and sustainability concerns. Despite this, the World Bank team was continuously engaged throughout project preparation and implementation and demonstrated good professionalism. It is important to note that the collaboration between the World Bank and the Borrower, particularly the PIU, has been valuable and critical for the project's final achievements and closing of the WQPP.

101. In particular, the World Bank team missed the restructuring opportunity to address some of the WQPP shortcomings and formally assess the impact of the SIDA and EC IPA grant investments on the O&M costs of the WWTP operations and then reflect them properly with financial and incremental cost assessments. Limited attention was given to wastewater collection: while the Client's municipalities agreed to wastewater network expansion and guaranteed wastewater flow to the new WWTPs, currently none of them operate according to the designed capacity.

D. RISK TO DEVELOPMENT OUTCOME

102. The authorities and all stakeholders at different levels continue to be committed to increasing wastewater treatment in BiH. However, during the WQPP implementation, there was a clear lack of engagement of higher authorities and, to a certain extent, absence of commitment from the municipalities with regard to undertaking the necessary actions to ensure the sustainability of the investments. This is reflected in the limited technical and financial capacity of the utilities to operate the WWTPs and the design of the WWTPs not accounting for progressive levels of connection to sewer networks. As a result, there are several challenges for the authorities in the post-completion phase of the project, to maintain the achievements, specifically: (a) low financial capacity because of low tariffs and substantial overall inefficiencies in the WWTPs operations. In Živinice, the utility went bankrupt in early 2018, and it is unclear how this specific utility would be able to continue operations of this WWTP; and (b) low technical capacity, need of qualified staff, and lack of interest from the authorities to improve the utilities' accountability through corporatization and reforms. The following is urgently required to maintain the project achievements:

(a) **Review of cost recovery for water supply and wastewater services provision.** The financial sustainability of all four utilities is poor and a review is needed to ensure that they can fully cover their operating costs. It is important to connect new customers to ensure that all the WWTPs operate in full capacity. At the same time, investment programs, including financing options, also need to be more systematically developed on par with the country development and increased demand on the quantity and quality of services.

(b) **Connection to wastewater collection systems remains low.** Currently, there is no financial capacity

at both municipal and utility levels to connect customers to the wastewater systems. The wastewater load at all the WWTPs is significantly below designed capacity, and thus are both inefficient and costly. It is important that municipalities and utilities would find financial resources to connect all residents to wastewater treatment systems.

V. LESSONS AND RECOMMENDATIONS

103. **It is imperative to secure upfront sustainability of investments and commitment of the authorities** at various levels in government to guarantee sustainable and efficient operations. In addition, it is important to understand the implications related to O&M costs that need to be covered by tariffs or other financial resources, when new systems would become operational.

104. **Starting a project with a large financing gap is a challenge, and timely cooperation with the Donor community is essential to guarantee proper and timely financing of all project components.** The WQPP proved that there was demand for wastewater collection and treatment in the country. Similar projects can obtain needed funding; however, these funds need to be fully committed before project implementation starts. The Project was, however, a good tool for the mobilization of grant resources and eventually got funding to address the financial gap identified during project preparation. The project investments exceeded original plans, and now Mostar and Živinice have two WWTPs with enhanced secondary treatment with nutrient removal. Additionally, Mostar has a Combined heat-power unit that will utilize the biogas.

105. **It is most important to have at least a limited proportion of project financing as a World Bank loan to have some financial leverage on implementation.** The WQPP was a self-standing GEF grant that also had contributions in the form of grants from other donors. Inadvertently, this created perverse incentives created by the availability of grants and their impact on the design of WWTPs. The co-financing from the donor side was limited to VAT, land acquisition and some payments related to contracts. Thus, WQPP had limited ownership at the national level as extensions could not increase commitment fees or use other financial tools that could encourage rapid completion or even cancelling the WQPP if needed. Also, WQPP grants could not be closed by the sole initiative of the Bank.

106. **It is essential to have active measures on wastewater collection and users' connection to sewers in parallel with wastewater treatment.** The WWTPs were designed with anticipation that municipalities will connect customers, which did not materialize during the WQPP implementation, in part due to the absence of adequate incentives and efforts by municipal utility companies to encourage the population to connect.

107. **There is need for a programmatic approach to align incentives at all levels for a program such as the WQPP, with clear externalities** with substantial global benefits. The decision to proceed with a traditional, single-investment focused operation did not provide the Bank with any flexibility to adjust to changing circumstances and political commitments to the key elements of the project (incl. tariff increases). It also prevented the creation of incentives at national / entity level. A programmatic approach with municipal utility companies and their local government competing for funds and selection based on clear commitment would probably have yielded better outcomes.

108. **The PIU-related decisions should have been properly weighed and perhaps modified during implementation and guarantee that all expected implementation mechanisms were fully functioning.** The Project did not have a financed PIU throughout its implementation – while it was hailed at appraisal giving the

Client more ownership of the project, it has proved to be a factor in slow project implementation. The Government did not allocate expected finances for the proper PIU operations.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: Improved knowledge and local capacity on wastewater pollution monitoring and control.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increased quality of the financial management at the utility level (Component E)	Text	No staff trained 18-Nov-2005	Increased quality of the financial management at the utility level 18-Nov-2005	Utilities received financial management training. Each Utility drafts an annual Business plan. 30-Dec-2016	Completed. Utilities received financial management training. Each Utility drafts an annual Business plan. The number of utility staff participated in trainings is about 20 30-Dec-2016

Comments (achievements against targets): Achieved. Utility staff participated in training.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Improved/Clarified institutional framework for wastewater management, financing and monitoring (Component A)	Text	No data collection and collaborative planning. 18-Nov-2005	Completion of the Water Improvement Plan. 18-Nov-2005	Water Information System (WIS) including: 1. water acts management module, 2. water use, water protection, and 3. ground water modules in BiH upgraded and expanded. Manual on biological monitoring on rivers and lakes/reservoirs in BiH. 30-Dec-2016	Completed Water Information System (WIS) including: 1. water acts management module, 2. water use, water protection, and 3. ground water modules in BiH upgraded and expanded. Manual on biological monitoring on rivers and lakes/reservoirs in BiH delivered. 30-Dec-2016

Comments (achievements against targets): Achieved. Water Information System (WIS) upgraded and expanded and manual on biological monitoring on rivers and lakes/reservoirs in BiH delivered.

Unlinked Indicators

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Percentage of the effluent discharged according to the	Text	40% of total BiH population is	After completion of this Project, 11% of	After completion of this Project, 40% of	Partially achieved. WWTP in Mostar is

national standard.		connected to public sewage. 5.5% of municipal waste water is treated and discharged according to existing standards. 15-Nov-2005	municipal wastewater (from population which are connected to public sewage) will be treated and discharged according to new BiH water-environment standards. 15-Nov-2005	municipal wastewater (from population which are connected to public sewage) will be treated and discharged according to new BiH water environment standards 30-Dec-2016	not yet operational and no connection to sewer collectors. 30-Dec-2016

Comments (achievements against targets): Partly achieved. The Waste Water Treatment Plant in Mostar is not yet operational and there are no connections to sewer collectors. In addition: (i) Zevinice WWTP is operational with biological treatment and nutrients removal; (ii) Trnovo WWTP has been rehabilitated; and (iii) Odzak WWTP has been rehabilitated including biological treatment with sludge management and utilization.
The unit of measure should be Percent and not Text which was selected in error.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Feasibility of natural low cost/low energy wastewater treatment solution for small towns and settlement demonstrated (Component C)	Text	No data available.	Feasibility of natural low cost/low energy wastewater treatment solution for small towns and settlement demonstrated.	Natural WW treatment Feasibility study on low cost treatment of WW on conditions relevant to Bosnia & Herzegovina prepared. Preliminary designs for at least 3 Pilot Plants nominated by FS prepared.	Completed. Natural WW treatment Feasibility Study on low cost wastewater treatment given conditions specific to Bosnia & Herzegovina have been prepared. Preliminary designs for at least 3 Pilot Plants selected by FS

					prepared.
		18-Nov-2005	18-Nov-2005	30-Dec-2016	30-Dec-2016

Comments (achievements against targets): Achieved. The natural wastewater treatment feasibility study on low cost/low energy wastewater treatment for small towns and settlements given conditions specific to Bosnia & Herzegovina were prepared and completed.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Improved coop. of BiH with institutions in Croatia, Serbia & Montenegro leading to agreement on most aspects of Waste Water Improvement Plan requiring cross-border cooperation. (Components A&E)	Text	Joint BiH/Croatian Working Group is holding meetings.	Joint BiH/Croatian Working Group in coordination with Serbia and Montenegro.	Continuous activity. Joint BiH/Croatian Group continues to operate it is working in coordination with Serbia and Montenegro and this facilitates agreement on majority of aspects requiring cross-border cooperation.	Continuous activity. Joint BiH/Croatian Group continues to operate it is working in coordination with Serbia and Montenegro and this facilitates agreement on majority of aspects requiring cross-border cooperation.
		18-Nov-2005	18-Nov-2005	30-Dec-2016	30-Dec-2016

Comments (achievements against targets): Partly achieved. This is a continuing activity.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

7. Feasibility study to rehabilitate, construct and maintain wetland area	Text	not available 18-Nov-2005	Feasibility study completed 18-Nov-2005	Study completion 30-Dec-2016	Feasibility study has been completed and 3 pilot projects identified and preliminary design prepared. 30-Dec-2016
Comments (achievements against targets): Achieved. Feasibility study completed and given to client.					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Nutrient pollutionreduction for Mostar:NitrogenAnnual reductionnutrients discharges (P& N kg/yr); avg. oper.cost nutrient reduc.process ($/kg/nutrients); anl. reduc.BOD discharges(tons/yr); avg op. co	Text	n/a 18-Nov-2005	Annual reduction in tons per year. N=255 t/y; P=44 t/y; BOD5=4400 t/y; Abatement costs: kg/BOD5=US$0.10; kg/nutrients (N+P)-$1.1 18-Nov-2005	Mostar WWTP Target values. Reduction of Nitrogen 226 tons/yr, Phosphorus 36 tons/yr 30-Dec-2016	Mostar WWTP is not yet operational, no connection to sewer collectors. 30-Dec-2016
Nutrient pollutionreduction for Mostar:Phosphorous	Text	0	0	36 tons/year	WWTP is not operational, no connection to sewer

		18-Nov-2005	18-Nov-2005	30-Dec-2016	collectors 30-Dec-2016
Nutrient pollutionreduction for Mostar:Nitrogen	Text	0	0	226 tons/year	WWTP is not operational, no connection to sewer collectors.
		15-Nov-2005	15-Nov-2005	30-Dec-2016	30-Dec-2016
Nutrient pollutionreduction for Zevinice –Phosphorous	Text	0	0	6 tons /year	2.68 tons / year
		15-Nov-2005	15-Nov-2005	30-Dec-2016	30-Dec-2016
Nutrient pollutionreduction for Trnovo Volume (mass) of BODpollution loads removedby the treatment plantsupported under theproject.	Text	n/a	0	DFR 200-250 m3/day, BOD 35 mg/l	DFR 200 m3/day, BOD 35.04 mg/l
		15-Nov-2005	15-Nov-2005	30-Dec-2016	30-Dec-2016
Nutrient pollutionreduction for Odzak Volume (mass) of BOD pollution loads removedby the treatment plant supported under the project	Text	n/a	0	BOD = 75 mg/l, COD= 230 mg/l, SS= 25 mg/l, DWF=80-100 m3/day	BOD = 75 mg/l, COD= 180 mg/l, SS= 25 mg/l, DWF=90 m3/day
		15-Nov-2005	15-Nov-2005	30-Dec-2016	30-Dec-2016

Nutrient pollutionreduction for Odzak --COD	Text	0 15-Nov-2005	0 15-Nov-2005	n/a 30-Dec-2016	COD 55 mg/l Average value 30-Dec-2016
Nutrient pollutionreduction for Odzak --SS	Text	SS – 2- 10 mg/l 15-Nov-2005	0 15-Nov-2005	n/a 30-Dec-2016	SS 10 mg/l, Average value 30-Dec-2016

Comments (achievements against targets): Partly achieved as follows: (i) the Mostar WWTP has been built but is not yet operational and there are no connections to sewer collectors. Commissioning of the WWTP is still pending as of April 15, 2018; (ii) Zevinice WWTP is operational with biological treatment and nutrients removal; (iii) Trnovo WWTP rehabilitated; and (iv) Odžak WWTP was rehabilitated including biological treatment with sludge management and utilization.

A.2 Intermediate Results Indicators

Component: Component A: River Pollution Reduction in BiH

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Volume(mass) of BOD pollution load removed by treatment plant under the project	Tones/year	0.00 18-Nov-2005	0.00 18-Nov-2005	4000.00 30-Dec-2016	345.00 30-Dec-2016

Comments (achievements against targets): 9% achieved. Only 345 has been achieved and not the envisaged 4,000 because Mostar WWTP is not operational.

Unlinked Indicators

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Full compliance with the provisions of the Water Law regulating water sector and issues of environmental pollution reduction	Text	Inter-ministry Steering Group is working to coordinate water sector development and environmental issues. 18-Nov-2005	Successful coordination by the BiH National Inter-ministry Steering Working Group on Water sector issues, environmental pollution in compliance with the Water Law 18-Nov-2005	Improved inter-ministerial coordination leading to compliance with the main provisions of the Water Law. 30-Dec-2016	Completed. Inter-ministerial coordination improved significantly leading to compliance with the main provisions of the Water Law. 30-Dec-2016
Comments (achievements against targets): Achieved. Inter-ministerial coordination improved significantly.					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Country adoption of the affordable water/ environment standards for municipally-based pollution	Text	Standards not harmonized with EU Directives.	Country adoption of the affordable water/ environment standards for municipally-based	Country adoption of the affordable water/ environment standards for municipally-based	Water law is complete. Guidlines for monitoring of implementation is in

			pollution.	pollution.	place.
		18-Nov-2005	18-Nov-2005	30-Dec-2016	30-Dec-2016

Comments (achievements against targets): Achieved. Water law is complete and guidelines for monitoring of implementation has been put into place.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increased stakeholder awareness and documented stakeholder involvement (number of meetings; number of publications).	Text	Insufficient cooperation between various stakeholders	Increased stakeholder awareness and documented stakeholder involvement.	Increased stakeholder awareness with completion of meetings and publications disseminated. Access to completed modules of Water Information System.	Completed. Increased stakeholder awareness with completion of meetings and publications disseminated. Access to completed modules of Water Information System.
		18-Nov-2005	18-Nov-2005	30-Dec-2016	30-Dec-2016

Comments (achievements against targets): Achieved. Meetings were conducted and publications disseminated. In addition, modules of the Water Information System have been completed.

B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1. Improved knowledge and local capacity on wastewater pollution monitoring and control.	
Outcome Indicators	*Component A* 1. Improved/Clarified institutional framework for wastewater management, financing and monitoring (Text). *Component E* 2. Increased quality of the financial management at the utility level (Text). *Component A and E* 3. Improved cooperation of BiH with institutions in Croatia, Serbia and Montenegro leading to agreement on most aspects of Waste Water Improvement Plan requiring cross-border cooperation (Text)
Intermediate Results Indicators	*Component E* 1. Increased stakeholder awareness and documented stakeholder involvement (number of meetings; number of publications) (Text) *Component D* 2. Full compliance with the provisions of the Water Law regulating water sector and issues of pollution reduction (Text)
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	*Component A* 1. Water Information System (WIS) fully achieved and includes: (a) water acts management module; (b) water use, water protection; and (c) ground water modules in BiH upgraded and expanded 2. Study on manual on biological monitoring on rivers and lakes/reservoirs in BiH achieved and delivered *Component D* 1. Water Law adopted by country and in compliance with main provisions of the Water Law *Component E* 1. Training of utilities on financial management has been achieved with annual business plans being drafted. About 20 staff participated 2. Increased stakeholder awareness achieved with documented meetings and publications disseminated 3. Strengthening of the Joint BiH/Croatian Group achieved and it continues to operate. It is working in coordination with Serbia and Montenegro
Objective/Outcome 2. Developed feasibility studies for natural wastewater treatment processes.	
Outcome Indicators	*Component C*

	1. Feasibility of natural low-cost/low energy wastewater treatment solution for small towns and settlement demonstrated (Text) 2. Feasibility study to rehabilitate, construct, and maintain wetland area (Text)
Intermediate Results Indicators	*Component D* 1. Country adoption of the affordable water/ environment standards for municipally based pollution (Text)
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	*Component C* 1. Natural wastewater treatment feasibility study on low-cost wastewater treatment achieved 2. Feasibility study on 'Using Natural Processes to Treat Municipal Wastewaters was completed *Component D* 1. Water Law adopted by country and in compliance with main provisions of the Water Law
Objective/Outcome 3. Global benefits from reduced pollution of Black Sea Danube and Adriatic Sea from municipal sources, including nutrients and BOD5 in amounts of 1.2 and 7,066 tons a year, respectively.	
Outcome Indicators	*Component A* 1. Percentage of the effluent discharged according to the national standard (Text) *Component B* 1. Nutrient pollution reduction for Mostar: Nitrogen Annual reduction nutrients discharges (P&N kg/yr); average operating cost nutrient reduction process ($/kg/nutrients); annual reduction BOD discharges (tons/yr); average operating cost (Text) 2. Nutrient pollution reduction for Zevinice - Phosphrous (Text) 3. Nutrient pollution reduction for Trnovo Volume (mass) of BOD pollution loads removed by the treatment plant supported under the project (Text) 4. Nutrient pollution reduction for Odžak Volume (mass) of BOD pollution loads removed by the treatment plant supported under the project (Text) 5. Nutrient pollution reduction for Odžak - COD (Text) 6. Nutrient pollution reduction for Odžak - SS (Text) 7. Number of Beneficiaries (Number)[10] *Component E* 1. Improved cooperation of BiH with institutions in Croatia, Serbia, and Montenegro leading to agreement on most aspects of Waste Water Improvement Plan requiring cross-border cooperation (Text)

[10] The Number of beneficiaries indicator was introduced in the 2012-2013 restructuring as a corporate mandate, however, it was not reflected into the Results Framework.

Intermediate Results Indicators	*Component A* 1. Volume (mass) of BOD pollution load removed by treatment plant under the project
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	*Component A* 1. Only 345 tons/yr achieved as the volume of mass of BOD pollution load removed by treatment plant 2. The effluent discharged according to the national standard is only partially achieved 3. Nutrient pollution reduction for Zevinice – Phosphrous, achieved 2.68 tons/yr 4. Nutrient pollution reduction for Trnovo Volume (mass) of BOD pollution loads removed by the treatment plant achieved BOD 35.04 mg/l (average from January to September) 5. Nutrient pollution reduction for Odžak Volume (mass) of BOD pollution loads removed by the treatment plant achieved BOD 75 mg/L on average 6. Nutrient pollution reduction for Odžak achieved COD 55 mg/l average value *7.* Nutrient pollution reduction for Odzak, achieved SS 10 mg/l on average *Component B* 1. Construction of 5 km of sewer mains achieved and a full-scale WWTP in Mostar though not operational 2. Rehabilitated wastewater treatment plant in Odžak achieved 3. Rehabilitated WWTP and expanded wastewater services to the Trnovo suburb of Turovi 4. Construction of full-scale WWTP with biological treatment and nutrients removal in Živinice 5. Partly achieved as there are only 45,000 beneficiaries and not 100,000 as targeted pending beginning of operation of the Mostar WWTP. *Component E* 1. Strengthening of the Joint BiH/Croatian Group achieved and it continues to operate. It is working in coordination with Serbia and Montenegro.

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Seema Manghee	Task Team Leader
Takao Ikegami	Technical Specialist
Vesna Francic	Operations Officer
Karl Kleiner	Technical Specialist
Phillip Moeller	Social Specialist
Alexandre Danilenko	Environmental Specialist
Bernard Baratz	Environmental Specialist
Jesus Renzoli	Senior Procurement Specialist
Mark Walker	Lead Counsel
Sanjay Vani	Senior Financial Management Specialist
Delphine A. Hamilton	Senior Program Assistant
Edward Daoud	Senior Finance Officer
Joseph Foote	Consultant
Supervision/ICR	
Sana Kh.H. Agha Al Nimer	Task Team Leader(s)
Karina Mostipan	Procurement Specialist(s)
Lamija Marijanovic	Financial Management Specialist
Delphine Alberta Hamilton	Senior Program Assistant
Senad Sacic	Program Assistant
Nikola Kerleta	Team Member
Dragana Varezic	Senior Program Assistant
Esma Kreso	Senior Environmental Specialist
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B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY04	19.225	142,275.18
FY05	17.527	175,402.02
FY06	0	5,311.27
Total	**36.75**	**322,988.47**
Supervision/ICR		
FY05	0	1,690.00
FY06	17.220	116,999.07
FY07	17.967	80,494.47
FY08	13.475	47,674.54
FY09	10.801	48,170.46
FY10	10.131	45,168.82
FY11	10.715	44,629.03
FY12	10.007	39,253.27
FY13	10.936	55,882.40
FY14	1.175	6,731.20
FY15	2.150	13,846.28
FY16	11.326	49,698.62
FY17	2.683	19,905.57
FY18	1.600	15,206.61
Total	**120.19**	**585,350.34**

ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US$M)	Actual at Project Closing (US$M)	Percentage of Approval (US$M)	Percentage at Completion
Reduction of River Pollution in BiH	0.45	0.17	5%	1%
High-Priority Investments	6.44	24.52	75%	83%
Natural Wastewater Treatment	1.28	0.85	15%	3%
Project Management	0		0	0%
Replication, Information Sharing and Implementation	0.4		5%	0%
VAT		1.71		6%
Land Acquisition		2.20		7%
Total	**8.57**	**29.45**	**100%**	**100%**

ANNEX 4. GLOBAL ENVIRONMENTAL BENEFITS, AND COST EFFICIENCY ANALYSIS

Project Background

1. The WQPP development objective was to further strengthen the capacity of BiH local utilities and reduce pollution from municipal sources into the Neretva and Bosna Rivers. The sub-objectives are the following: (i) develop the Wastewater Improvement Plan; (ii) establish a Joint BiH/Croatian Working group, with coordination from Serbia and Montenegro to implement the plan; (iii) develop and implement high-priority, low-cost water capital investments; and (iv) disseminate information in BiH and the region for replication of project activities at other priority sites in the Balkans. The Bank could further improve ongoing communication between the neighboring countries, which would need to reach agreement on origination of water polluters and M&E of water quality and expand this cooperation to other neighboring countries. The global objective was to reduce municipal pollution and nutrients from municipal and non-point pollution sources.

Sector Context and Baseline Scenario

2. BiH is actively pursuing a strategy for the rapid economic recovery driven by the EU accession process. The latter requires sustainable development of infrastructure, however it acknowledged the need to incorporate sufficiently aspects of environmental sustainability into the execution of its development goals. During the implementation of several World Bank projects and several GEF initiatives related to environmental sustainability in the country and cooperation with the BiH neighbors to achieve common environmental goals, it was possible to achieve the consensus among all concerned parties that the condition of infrastructure, and specifically wastewater operations, are the limiting factor of the municipal development in Mostar, Odžak, Trnovo (as a part of Sarajevo metropolis) and Živinice. The municipal authorities of mentioned cities had already developed an extensive program for the rehabilitation and upgrading the wastewater systems and treatment facilities. The program was based on the concept of pollution prevention, versus remediation, as a more cost-effective way to achieve the objectives. The GEF support would be a logical step in the support for the successful implementation of this program.

Baseline

3. Mostar, Odžak, Trnovo and Živinice have a total population of 160,000 residents and are located on key river basins of the Balkan region: Adriatic Sea (Mostar) and Danube (the rest of the municipalities). These municipalities are important industrial and tourist centers. The system of wastewater mains in these cities was built to catch up the booming growth of the former Yugoslavia during 1970-1980s, and soon after the Sarajevo Olympic Games in 1984. During the internal conflict in 1992-1994, the wastewater infrastructure was significantly damaged, specifically in Mostar and Odžak. The WQPP was considered a driving force to reconstruct a damaged infrastructure and achieve sustainable instruments to protect environment.

4. It was expected that the WQPP and respective municipal programs will provide for the rehabilitation of the wastewater system and the new and reconstructed wastewater treatment facilities will eliminate the untreated wastewater discharges into Adriatic and Danube Basins. It was expected that after the completion of the WQPP, all the wastewater from the mentioned municipalities will be processed at the WWTPs. The municipalities were also ready to support the proposed program and connect more users to wastewater collection network and co-finance the proposed activities. Table 4.1 presents the baseline and the goals for nutrient discharges.

Table 4.1. Annual Nutrient Discharges from WQPP Municipalities

	Discharges into Mediterranean Sea Basin		Discharges into Danube Basin	
	Before the project	**After the project**	**Before the project**	**After the project**
Nitrogen (tons)	408	204	219	109
Phosphorus (tons)	77	61	13	9
Total nutrients per year (tons) before the project	**617**			
Total nutrients per year after the completion of the WQPP and full operation of all WWTPs at designed capacity (tons)	**361**			

5. The WQPP will also help combat emissions of BOD5 from all municipalities reducing pollution that contributes to reduced concentration of oxygen in waters.

GEF Project Benefits

6. The WQPP financed the rehabilitation, modernization and improvement of the wastewater treatment and introduction of the enhanced treatment in Živinice and Mostar along with technical assistance for replication of the project. The estimated reduction of nutrient discharges from the current level are 50 percent for both nitrogen and 20 percent of phosphorus after the project implementation and operation of all WWTPs.

7. The WQPP project generated additional operational costs for the utility, including labor and chemicals for the phosphorus precipitation. It was to employ additionally 27 technicians, of which 20 in Mostar, five in Živinice and one each in Odžak and Trnovo. Also, the annual electricity consumption of the utilities has grown by 40 percent due to wastewater treatment and nutrient reduction process.

Costs

8. The total investment costs for the wastewater treatment processes were 83 percent of the total WQPP costs or US$24.5 million of which the GEF financed US$6.44 million.

Benefits

9. The benefits expected from the project include the substantial reduction of the nutrient pollution and limiting BOD5 pollution.

Incremental Costs

10. Table 4.2 summarizes the incremental cost calculations for the WQPP plan compared to the baseline. Since most of the impacts of the project will be at the level of WWTPs, the scope of the analysis mostly includes themselves and their customers. Most of the calculations are done on year-by-year data with a 22-year horizon since 2010, the original date of the project closing. The life cycle costs are discounted to a 2010 present value at 10 percent rate. The incremental costs calculated for this analysis represent the difference in the present value of

four life cycle cost streams for each of the utility.

11. The efficiency of the investments was assessed based on the incremental cost analysis to the GEF grant portion of the project for removal nutrients and BOD5. This ICR follows the same methodology based on similar assumptions. The team used incremental cost analysis (before and after the project) considering both original project outcomes (improving living conditions, using property value increase as a proxy) and additional outcomes related to global benefits with reduction of: (a) nutrients flowing into the both Adriatic Sea and Danube River Basin; and (b) BOD5 reduction due to implementation of the secondary treatment process. Additional global benefits from operation of the CHP unit at the Mostar WWTP with heat and electricity replacement. The project benefits are assessed for 20 years since investments became fully operational in the first city of Trnovo or from 2012 to 2032. It was also expected that all the WWTPs will be operational according to designed capacity since 2022, when the total number of residents connected to the WWTPs will reach 160,000. The total amount of nutrients removed are estimated at the level of 5,000 tons or about 361 tons of nitrogen and phosphorous (N&P) a year after all the WWTPs will operate at the designed capacity. The amount of BOD removed will be in a range of 1,920 tons a year respectively. The abatement costs are summarized below in table 4.2.

Table 4.2. WQPP Abatement Costs

	Mostar	Odžak	Živinice	Trnovo	Total for the Project
Nutrients removed 2012-2032, kg	2,647,746.50	745,434.03	1,455,985.91	148,647.35	4,997,814
Investments in WWTP (US$)	$ 14,398,895	$ 2,292,522	$ 3,043,693	$ 669,875	$ 20,404,985
Abatement cost N&P per kg removed (US$)	$ 5.44	$ 3.08	$ 2.09	$ 4.51	$ 4.08
BOD5 removed, kg	140,744,000	39,624,400	77,394,600	7,901,520	265,664,520
Abatement cost per kg of BOD5 removed (US$)	$ 1.00	$ 0.59	$ 0.42	$ 0.78	$ 0.83

12. The marginal abatement costs for nutrients are substantially higher than at the WQPP appraisal reflecting actual investments at every WWTP and lower-than-expected wastewater flow (about 50 percent in Odžak, Trnovo and Živinice, and no wastewater treatment until second half of 2018 in Mostar). However, they are close to the international benchmark of the US$5.

13. **Cost-efficiency analysis.** The WQPP was cost efficient as its investments were at par or below similar costs in the West Balkans region. The higher per unit cost for smaller WWTPs is explained by the lower economy of scale of the WQPP wastewater treatment operations.

Table 4.3. Cost-efficiency Comparisons Construction of WWTP

Name of the Project	City	Cost	Unit Cost
Croatia Coastal City Pollution Control Project 2 (World Bank)	Zadar, secondary treatment only	EUR 15.2 million	EUR 70 per m^3 a day of capacity
Zagreb Wastewater Treatment Plant (European Bank for Reconstruction and Development)	Zagreb, tertiary treatment	EUR 274 million	EUR 110 per m^3 a day of capacity
Sarajevo Wastewater Treatment Plant	Sarajevo, tertiary	US$29 million	US$145 per m^3 a day of

(World Bank)	treatment		capacity
Mostar Wastewater Treatment Plant	Mostar, secondary treatment with enhanced effluent treatment and biogas utilization	US$14.4 million	US$144 per m^3 a day of capacity
Živinice Wastewater Treatment Plant	Živinice, secondary treatment with enhanced effluent treatment	US$3.01 million	US$180 per m^3 a day of capacity
Odžak WWTP rehabilitation	Rehabilitation of the WWTP with secondary treatment	US$2.3 million	US$240 per m^3 day of capacity
Trnovo WWTP rehabilitation	Rehabilitation of the WWTP with secondary treatment	US$700,000	US$304 per m^3 day of capacity

ANNEX 5. GEF STRATEGIC PARTNERSHIPS

1. The three GEF Strategic Partnerships the WQPP benefitted from are the following:

   (a) The GEF Strategic Partnership for the Danube/Black Sea Basins provides a common framework for addressing transboundary pollution in the basin with focus on nutrient reduction. It provides financial support to accelerate on-the-ground implementation of the Danube and Black Sea Basin Strategic Action Program (SAPs). The Strategic Partnership was approved by the GEF Council in May 2001 with an overall envelope of US$95 million (US$70 million for the GEF-World Bank Investment Fund for Nutrient Reduction and US$25 million for the United Nations Development Programme/UNEP-GEF regional projects).

   (b) The GEF Strategic Partnership for the Mediterranean Large Marine Ecosystem provides a framework for the basin countries under the Barcelona Convention to implement priority pollution reduction measures identified in the two SAPs for land-based pollution and biodiversity. Under the Partnership, countries are able to access funds for capacity building and investments supporting pollution reduction, river basin management, and marine and coastal biodiversity conservation in hot spots. It was to be funded by a GEF grant of US$100 million over multiple tranches.

   (c) The World Bank-GEF Investment Fund for Nutrient Reduction in the Danube/Black Sea Basin is the investment arm of the GEF Strategic Partnership for the Danube/Black Sea Basin. It received GEF funding of US$70 million over three approved by the GEF Council in May 2001, 2002 and 2003 respectively.

ANNEX 6. EVOLUTION OF PROJECT INDICATORS

Table 6.1.Evolution of Pre- and Post -Restructuring Indicators, Targets, and Achievements

PRE-RESTRUCTURING INFORMATION FROM PAD		POST-RESTRUCTURING CHANGES (2012/2013)		
PDO Indicators	**Targets (from ISR#2[11])**	**PDO Indicators**	**Targets**	**Achievements**
Reduction of water pollution of Bosna and Neretva from municipal sources of BiH	na	Dropped		
Development of the Wastewater Improvement Plan[12]	Completion of the Water Improvement Plan.	**Modified**. Improved/clarified institutional framework for wastewater management, financing and monitoring.[13]	**Modified.** A Water Information System (WIS) and a manual on biological monitoring on rivers and lakes/reservoirs in BiH	**Achieved.** Water Information System (WIS) including: 1. water acts management module, 2. water use, water protection, and 3. ground water modules in BiH upgraded and expanded. Manual on biological monitoring on rivers and lakes/reservoirs in BiH delivered
Reduction of discharges from municipalities involved in the Project BOD discharges by 50% N-discharges by 50% P-discharges by 50% Implementation of investments	na	Dropped		
Feasibility Study for Natural Wastewater Treatment component	na	**Modified**. Feasibility of natural low cost/low energy wastewater	Natural WW treatment feasibility study on low cost treatment of WW	**Achieved.** Feasibility study completed and 3 pilot projects identified and preliminary design

[11] As the targets were not clearly defined in the PAD, targets in the Implementation Status and Results Report (ISR) #2 were used.
[12] This was overlapping with GEF Specific Indicator table on page 27 of the PAD and reads: 'Development of Water Improvement Plan for reduction of river pollution in BiH and its endorsement by the Government'.
[13] To prevent duplication of activities, water sector representatives in BiH proposed changes to Component A that were agreed with the Bank and adjusted for two reports.

		treatment solution for small towns and settlement demonstrated	on conditions relevant to Bosnia & Herzegovina prepared. Preliminary design for at least 3 Pilot Plants nominated by FS prepared	prepared.
Additional GEF Specific – PDO Indicators	**Targets[14]**	**GEF PDO Indicators**	**Targets**	**Achievements**
Further strengthening of a Joint BiH/Croatian Working group, with coordination from Serbia Montenegro to coordinate activities and monitoring.	Joint BiH/Croatian Group working in coordination with Serbia and Montenegro.	**Modified**. Improved cooperation of BiH with institutions in Croatia, Serbia & Montenegro leading to agreement on most aspects of Waste Water Improvement Plan requiring cross-border cooperation.	**Modified**. Joint BiH/Croatian Group working in coordination with Serbia and Montenegro which facilitates agreement on majority of aspect requiring cross-border cooperation.	**Achieved** and is a continuous activity. Joint BiH/Croatian Group continues to operate. it is working in coordination with Serbia and Montenegro and this facilitates agreement on majority of aspects requiring cross-border cooperation.
Feasibility study to rehabilitate, construct and maintain wetland area	Completion of natural waste water treatment study.	No change	**Modified.** Feasibility study has been completed and 3 pilot projects identified and preliminary design prepared.	**Achieved.** Feasibility study has been completed and three 3 pilot projects identified and preliminary design prepared.
Percentage of the effluent discharged according to the national standard	After completion of this Project, 11% of municipal wastewater (from population which are connected to public sewage) will be treated and discharged according to new BiH water-	No change	**Modified**. After completion of this Project, 40% of municipal waste water (from population which are connected to public sewage) will be treated	**Partially achieved**. WWTP in Mostar is not yet operational and no connection to sewer collectors. The Trnovo, Odzak and Zivinice WWTPs are operational.

[14] As the targets were not clearly defined in the PAD, targets in the Implementation Status and Results Report (ISR) #2 were used.

	environment standards		and discharged according to new BiH water environment standards.	
Nutrient pollution reduction (N and P kg discharges from the municipal sources per year) as a result of the investment program - annual reduction of nutrients discharges (P and N kg/year); - average operation cost of nutrient reduction process (US$/kg of nutrients); - annual reduction of BOD discharges (tons/year); - average operation cost of the BOD reduction (US$/kg of BOD).	Annual reduction in tons per year N=255 t/y; P=44 t/y; BOD5=4400 t/y; Abatement costs: kg/BOD5=US$0.10; kg/nutrients (N+P)- $1.1.	**Modified.** Indicator is broken down by treatment plant as illustrated below.	No change	**Partially achieved**. Construction of 5 km of sewer mains achieved and a full-scale WWTP in Mostar though not operational.
		New. Nutrient pollution reduction for Mostar: Phosphorous	36 tons/yr	**Not achieved.** Mostar WWTP not operational
		New. Nutrient pollution reduction for Mostar: Nitrogen	226 tons/yr	**Not achieved.** Mostar WWTP not operational.
		New. Nutrient pollution reduction for Zevinice – Phosphorous	6 tons/yr	**Partially achieved.** 2.68 tons/yr
		New. Nutrient pollution reduction for Trnovo Volume (mass) of BOD pollution loads removed by the treatment plant supported under the project.	DWF: 200-250 m3/d BOD – 35 mg/l	**Achieved.** DFR 200 m3/day BOD 35.04 mg/l

		New. Nutrient pollution reduction for Odzak Volume (mass) of BOD pollution loads removed by the treatment plant supported under the project	DWF: 80-100 m3/d BOD: 75 mg/l COD: 230 mg/l SS: 25 mg/l	**Achieved.** BOD = 75 mg/l COD= 180 mg/l SS= 25 mg/l DWF= 90 m3/day
		New. Nutrient pollution reduction for Odzak -- COD	n/a	**Partially achieved**. COD 55 mg/l Average value
		New. Nutrient pollution reduction for Odzak – SS	n/a	**Partially achieved.** SS 10 mg/l Average value
		New. Increased quality of the financial management at the utility level	Utilities received financial management training: each utility drafts annual business plans. Participating utilities have improved service delivery performance and increased efficiency, while managerial and institutional capacity has been strengthened	**Achieved**. Utilities received financial management training. Each utility drafts an annual business plan. The number of utility staff participated in trainings is about 20.
		New. Project Beneficiaries Of which female (beneficiaries)[15]	100,000 55,000	**Partially achieved** 45,000 **Partially achieved** 25,000
Intermediate Results Indicators	**Targets**	**Intermediate Results Indicators**	**Targets**	**Achievements**

[15] The Number of beneficiaries indicator was introduced in the 2012-2013 restructuring as a corporate mandate, however, it was not reflected into the Results Framework.

		New. Volume (mass) of BOD pollution load removed by treatment plant under the project[16]	4,000 tons per year	**Partially achieved** Only 9% of original target. 345 tons per/yr. Mostar WWTP not operational.
Additional GEF Specific - Intermediate Results Indicators	**Targets**	**GEF Intermediate Results Indicators**	**Targets**	**Achievements**
The BiH national inter-ministry steering Working Group engaging key ministries that are involved in water sector development and environmental pollution from the municipal sources and follow up with the Water Law. (Ministry of Environment, Ministry of Agriculture, Water Management and Forestry, PCWM and donors).	Successful coordination by the BiH National Inter-ministry Steering Working Group on Water sector issues, environmental pollution in compliance with the Water Law	**Modified and moved from PDO to Intermediate Indicator level**. Full compliance with the provisions of the Water Law regulating water sector and issues of environmental pollution reduction	**Modified**. Improved inter-ministerial coordination leading to compliance with the main provisions of the Water Law.	**Achieved.** Inter-ministerial coordination improved significantly leading to compliance with the main provisions of the Water Law.
Country adoption of the affordable water/ environment standards for municipally-based pollution	Country adoption of the affordable water/ environment standards for municipally-based pollution.	**Modified.** Moved from PDO level to Intermediate level	No change	**Achieved.** Water law is complete. Guidelines for monitoring of implementation is in place.
Increased stakeholder awareness and documented stakeholder involvement (number of meetings; number of publications)	Increased stakeholder awareness with completion of meetings and publications disseminated.	No Change.	**Modified** Increased stakeholder awareness with completion of meetings and publications disseminated. Access to completed modules of Water Information System	**Achieved.** Increased stakeholder awareness with completion of meetings and publications disseminated. Access to completed modules of Water Information System

[16] This intermediate indicator was introduced into the Results Framework of ISR# 12 of December 2014 as part of mandatory corporate sector indicators.

ANNEX 7. BORROWER COMMENTS

1. The Ministry of Agriculture, Water Management and Forestry provided comments to the draft Implementation Completion and Results Report (ICR) by letter on June 1, 2018, reference No. 07-2-25/2-2297-4/17 HA and is summarized below:

a. The Borrower agrees with the Bank on the overall conclusions of the ICR. It was acknowledged that there was inadequate financial operations and sustainability of the constructed facilities that could affect further financing in the sector. However, it was illustrated that the Project did achieve its goals and the challenges on sustainability and tariff setting measures for the Waste Water Treatment Plant (WWTP) were not part of the Grant Agreement. The legal agreements with the European Bank for Reconstruction and Development and the European Investment Bank had allocations of credit and grant financing to set appropriate tariffs to ensure investment sustainability. Lack of this in the World Bank's Grant Agreement is seen as a failure by the Borrower.

b. Furthermore, during Project implementation, the assessment of the sewerage system was lacking and the ICR confirms this. It is also noted that Sludge treatment and disposal have not been addressed thus directly affecting investment sustainability. Hence, the number of population equivalent served or to be served by the constructed facilities is not accurate particularly for the City of Mostar.

c. Mostar WWTP trial operations have been postponed. Since closure of the local account for Project support in December 2017, the Ministry of Agriculture, Water Management and Forestry has been unable to act as all funding has been exhausted. This matter has been repeatedly brought to the attention of the Federation Ministry of Finance elaborating in detail the overall issues related to implementation of water and utility directives and proposing additional support to enable this facility to start operations. However, no response has to date been received.

d. It was pointed out that there was inadequate project preparation and appraisal by the World Bank in other projects too underscoring inadequate technical and other expertise of the consultants hired to prepare projects. It was pointed out that the WB-WBIF Klokot Spring Protection Zone Study is yet to be implemented after the TOR was completed 3.5 years ago.

e. In line with the Grant Agreement and Project Appraisal Document, the Project Management Team (PMT) and Project Implementation Teams (PITs) fully performed all tasks under the Project to completion and significantly increased the Project scope. All this was done on a volunteer basis, presenting exceptional success.

f. The Ministry of Agriculture, Water Management and Forestry prepared and submitted to the Federation of BH Government a report on the issues related to the said Project with the proposal to initiate a few actions and procedures aimed at addressing Project challenges, including institutional and legal reform of the water utility services. This proposal was submitted to the Bank and attached hereto. The Report included detailed analysis of responsibilities and obstacles for establishment of sustainable water utility sector in the Federation of BH, as well as key stakeholders for implementation of economic reform of this sector. To that end, consultations were held with all the interested

institutions and obtained opinions on the Report prepared by the Ministry, including additional consultations held with Cantons. We note that the proposals made by this Ministry to the Government correspond with the outcomes of the Project specified in your letter.

g. As the issues related to sustainability of the constructed facilities and setting tariffs for this purpose fall, pursuant to the Federation of the BH Constitution, under the responsibility of local self-governance units, and since these measures were not included in the Grant Agreement, the Borrower does not accept the Project evaluation given that all the activities envisaged under the Project were successfully completed.

2. Comments were also received from Mr. Almir Prljaca, Project Coordinator of the Water Quality Protection Project on June 4, 2018. Disappointment in the rating of the Project was expressed as it is considered successful due to the following results summarized below:

a. Initial financing from the Global Environment Facility (GEF) of US$8.9 million was later augmented by additional funding from the European Union and SIDA. This was because of the good results achieved by the Project that attracted the added financing from other donors.

b. Emphasis was placed on activities under Components 'A' and 'C' that originally covered the territory of the Federation of Bosnia and Herzegovina (BiH). For instance, the development of three modules of Water Information System (ISV) are not only being used in the Federation of BiH, but also by the Water Agency for Adriatic Sea in Mostar and the Public Company Vode Srpske in Bijeljina.

c. The prepared manual and sampling of biological parameters of water quality set the basis for the establishment of biological monitoring in BiH, according to the requirements set in the EU Water Framework Directive and the Water Law of FBiH. A very important aspect of the development of this manual is the education of local staff employed in water management institutions in BiH, who use the acquired knowledge and experience from this project in their everyday work.

d. The Waste Water Treatment Plants that were reconstructed and built are currently not operating at full capacity and it was pointed out that it is the responsibility of the local community and utility companies to ensure that these are operating normally. Furthermore, local communities do not have adequate resources to ensure sustainability of operation and maintenance of plants and this is a general challenge faced within the water sector and should not be blamed on the Water Quality Protection Project.

e. Construction of the plant in Mostar resulted in extending the duration of Project implementation. This was beyond the Project domain and involved the issue of ownership of the plant site that was eventually resolved. The current challenge of releasing the Mostar WWTP into trial function is related to the activities on another project that involves the main sewage collectors on both banks of the Neretva river.

f. The treatment of communal and municipal waste water in Trnovo, Turovi, Odzak, Zivinice and Mostar has contributed to the reduction of pollution and protection of rivers such as: Zeljeznica river, Bosna river, Sava river, Sprece river and Neretva river. Treatment of waste water from the settlements

covered under the Project reduces nitrogen and phosphorus pollution of surface water which is in line with the provisions of the EU Water Framework Directive and the Program of measure of the Sava River Basin Management Plan in FBiH.

ANNEX 8. BENEFICIARIES MEETINGS SUMMARY

1. The Project was officially closed on December 31, 2016. The investments in Trnovo were completed in 2010, in Odžak in 2011, in Živinice in 2016, and in Mostar all construction works and testing were completed in 2016, however commissioning of the WWTP is still pending as of June 11, 2018. The commissioning of the Živinice Wastewater Treatment Plant has been completed and the plant was transferred to the Živinice Communalac management in May 2016.

2. Bosnia and Herzegovina (BiH) Water Information System (WIS) has been fully operational since 2009 for both Neretva and Bosna River Basins at the basin managements in Mostar and Sarajevo respectively. The study on Biological Monitoring on Rivers and Lakes/Reservoirs in BiH is fully operational since its transfer to the Client in 2010. Also, the feasibility study on 'Using Natural Processes to Treat Municipal Wastewaters of Smaller Cities and Settlements in the Territory of BiH' was developed and transferred to the Client in 2010. For the latter, the three settlements (Velagići-Hadžići in Ključ Municipality, Grborezi in Livno Municipality, and Orahovo in Bosanska Gradiška Municipality) received conceptual designs of the natural low-cost wastewater treatment designs that were developed and transferred to the Client and to municipalities.

3. The project financed the construction and rehabilitation of four WWTPs cumulatively serving 160,000 population. It also constructed nearly 5.0 km of wastewater mains in Mostar. In Mostar and Živinice, the WQPP financed construction of so-called secondary-plus wastewater treatment plants and in Mostar it also has combined heat-energy unit with sludge digestion and biogas generation.

4. All construction and commissioning is completed at all locations, except in Mostar. However, some issues (both technical and financial remain). Specifically:

(a) In Trnovo, the small wastewater treatment plant utilizes the rotating biological contactor process, which was operational during the ICR supervision mission. The capacity of the plant is 1,500 m^3/day, however the flow is not more than 500 m^3 a day, serving about 1,500 residents and several small industries. Many of its potential customers are still not connected for a variety of reasons. The Trnovo wastewater collection system combines wastewater and storm water, thus the wastewater is weak, with average BOD5 content is in a range of 40-60 mg/l, ammonia content 9-11 mg/l and Phosphorus-eq in a range of 1 mg/l. The treatment reduces the pollution to the level corresponding to the BiH national standard. Due to overcapacity, the rotating system is turned on for a few hours a day in the winter and for about half a day in summer. The Trnovo WWTP is a part of the Sarajevo Water and Wastewater Utility (Sarajevo ViK) and as such is financially part of the Sarajevo ViK operations. All systems were operational at the time of the visit.

(b) The Odžak WWTP has a standard treatment process with mechanical sedimentation and biological treatment reactor with aeration and collection of the excess sludge stabilization. Its wastewater inflow is substantially below capacity, so the biological treatment process did not function (was frozen) at the time of the mission. The incoming wastewater is of weak quality and just with operational mechanical treatment and grit removal it can meet the national discharge standard. One of two motors of the wastewater lift was broken at the time of the visit. The plant is designed for about 2,000 m^3/day, or 20,000 population equivalent, but currently serves only 5,000 residents and several industries. The utility plans to connect to the wastewater system about 10,000 residents in

the next five years. The repair and connection costs of additional customers to achieve the designed capacity is estimated at the level of BAM 150,000 (US$100,000). The utility is financially supported by the Odžak Municipality that covers electricity costs of the Odžak Communalac. The wastewater tariff is BAM 0.10 per m^3 (US$0.07).

(c) The Živinice WWTP has two stages of treatment with anoxic removal of nitrogen. Technical parameters of the wastewater treatment fully correspond to the design of reducing BOD5 at inlet from about 75-100 mg/l to 15 mg/l, phosphorus from 2.0 mg/l to nearly 1.0 mg/l and nitrogen from 18.0 mg/l to less than 3.0 mg/l. The effluent quality was corresponding to the national and the EU wastewater treatment regulations. However, since February 2018, Živinice Communalac is undergoing bankruptcy protection procedures and does not have financial resources to purchase iron chloride for the phosphorus chemical precipitation and full operation of its nitrogen removal system. The maximum capacity of the Živinice WWTP is 20,000 m^3/day of wastewater, however current wastewater flow is in the range of 4,000-6,000 m^3/day. The Živinice WWTP has substantial issues with its operation. One of the grit lifts is broken due to poor manufacturing and has not been operating for more than a year. One of its engines for wastewater moving through the biological reactor does not function as well. Also, there are some design issues that require some reengineering of the wastewater flow between the grit chamber and primary settler that currently require additional pumping. The total cost of the repair is estimated to be BAM 600,000 (US$400,000). The wastewater tariff is low – less than US$0.07 per m^3, does not correspond to the O&M costs, and financial loss of wastewater operations apparently contributed to the bankruptcy of the Živinice Communalac.

(d) The Mostar WWTP was constructed and tested in 2016-2018. After it becomes fully operational later this year, it will operate at about half of its capacity serving the population at the left bank of the Neretva River. The ongoing municipal project plans to connect the other half of the city in 2019; and then the plant is expected to operate in full capacity. The wastewater and storm water collection systems are combined now, and it is unlikely that wastewater will correspond to the designed wastewater quality. Also, the amount of the generated sludge will not be enough for the constructed sludge digestion system with biogas collection and CHP operation, until the wastewater system will be completed. The alternative systems for heat generation are fully functional, however, and can operate until the wastewater collection system will be completed and connected to the Mostar WWTP. Currently, there is no wastewater tariff in Mostar[17].

[17] http://vodovod-mostar.com/cijena_vode.html.