Former Yugoslav Republic of Macedonia

Ex-Post Evaluation of Japanese ODA Loan

"Zletovica Basin Water Utilization Improvement Project"

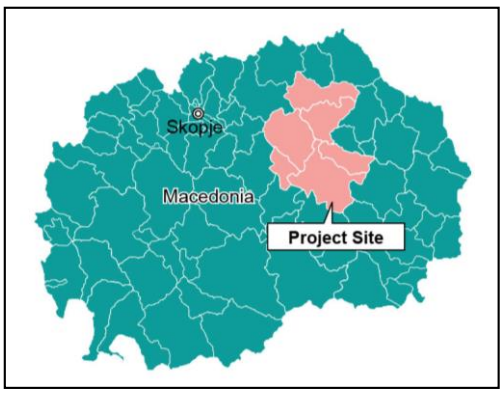
External Evaluator: Nobuyuki Kobayashi, OPMAC Corporation

0. Summary

The objective of this project was to stabilize the supply of service and industrial water by the construction of a multipurpose dam and water supply related facilities in the eastern part of Macedonia, thereby contributing to the improvement of living among residents and the promotion of industry in the region. This project is in line with the Macedonian national development policy and their development needs as well as Japan's ODA policy. However, the project scope was not defined appropriately as water quality tests at the water intake points and the tributaries were not conducted. The output of this project was not sufficient for incidence of outcome and, therefore, the relevance of the project is fair. The efficiency of the project is fair. Although a price competitive Macedonian company undertook the engineering work and the project cost was less than planned, the project period exceeded the plan due to a delay in the procurement and an extended construction period. Also, although a piped water system is in use at the target area, and there have been improvements in sanitary conditions and life convenience; the coverage of this project is limited and the raw water supply volume and revenue from raw water sales are significantly below the plan. Furthermore, as there are no transmission pipelines (hereafter, "raw water pipelines") installed in the upstream area, the water quality has tended to worsen and therefore water supply service to municipalities with large populations has not yet commenced. For the above reasons, the effectiveness and impact of this project are low. Although the revenue of PE Hydrosystem "Zletovica" can ensure the minimum level to finance O&M activities, it will be difficult to recover the investment cost and it is unlikely that revenue to cover rehabilitation can be secured and, therefore, the sustainability is fair.

In light of the above, this project is evaluated to be unsatisfactory.

1. Project Description



Project Location

Knezevo Dam

1.1 Background

The former Yugoslav Republic of Macedonia (Macedonia) was a country with little rain and the eastern part of the country (the target area of this project) suffered the most. The target area faced frequent water outages during the summer because the source of existing water supply system was underground water. In addition, underground water in the project area located in the eastern part of the country contained a high concentration of heavy metals due to mining operations. Heavy metal contamination from a mining accident had occurred in the past which further limited utilization of the underground water. Low quality drinking water was being used because of scarce water sources, and there was a risk of infectious diseases. Furthermore, since the independence of Macedonia, job creation had been an issue in this region, and promotion of industry and agricultural development through water source development has gained interest. It was concluded that constructing a dam which could utilize snow and rain in winter seasons was promising because the amount of precipitation has significant seasonal variations and the eastern region's mountainous geography made supplying water from other areas difficult .

Given the above situations, supplying safe and stable water to the target area was an important policy task for Macedonia, and developing water sources in the Zletovica river basin (including the construction of a multipurpose dam) was established. At that time, this water source development was divided into three phases; construction of a dam and developing water supply facilities (Phase 1), development of irrigation facilities (Phase 2) and construction of a small-scale hydropower plant (Phase 3). This project was Phase 1, which included the construction of the Knezevo dam and water intakes, the construction of raw water pipelines and the construction and rehabilitation of a water treatment plant.

1.2 Project Outline

The objective of this project was to stabilize the supply of service and industrial water by the construction of a multipurpose dam, water intakes, and raw water pipelines in the eastern part of Macedonia, thereby contributing to the improvement of living among residents and the promotion of industry in the region.

Loan Approved Amount/ Disbursed Amount	9,689 million yen / 9,685 million yen	
Exchange of Notes Date/ Loan Agreement Signing Date	October 2003 / November 2003	
Terms and Conditions	Interest Rate	1.5%
	Repayment Period (Grace Period)	25 years (7 years)
	Conditions for Procurement	General untied (Consultants are general untied)
Borrower/Executing Agency	Government of Republic of Macedonia/ Ministry of Agriculture, Forestry and Water Economy	
Final Disbursement Date	January 2013	
Main Contractor	FZC 11 Oktomvri A.D.(Macedonia)/DG Beton A.D.(Macedonia)/ GD Granit A.D.(Macedonia) (JV), DG Beton A.D.(Macedonia)/GD Granit A.D.(Macedonia) (JV)	
Main Consultant	Coyne et Bellier (France)/ Electric Power Development Co., Ltd. (Japan)/Oriental Consultants Co. Ltd. (Japan) (JV)	
Feasibility Studies, etc.	• JICA(1999), The study on integrated water resources development and management master plan in FYR Macedonia • JBIC(2001), Special Assistance for Project Formulation (Phase I) for Zletovica Basin Water Utilization Improvement Project(SAPROF I) in FYR Macedonia • JBIC(2003), Special Assistance for Project Formulation (Phase II) for Zletovica Basin Water Utilization Improvement Project(SAPROF II) in FYR Macedonia • JBIC (2004), Special Assistance for Project Implementation for Zletovica Basin Water Utilization Improvement Project in FYR Macedonia (SAPI) • JICA (2014), Special Assistance for Project Implementation for Zletovica Basin Water Utilization Improvement Project in FYR Macedonia (SAPI)	
Related Project	Government of Slovenia “Construction of Water Treatment Plant for Drinking Water in Probistip”, Government of Slovenia “Renovation of Waste Water Treatment Plant for Drinking Water in the Municipality of Stip”	

2. Outline of the Evaluation Study

2.1 External Evaluator

Nobuyuki Kobayashi (OPMAC Corporation)

2.2 Duration of Evaluation Study

The duration of the evaluation study is as follows.

Duration of the Study: September 2014-September 2015

Duration of the Field Study: December 18 -December 31, 2014, March 20-March 26, 2015

3. Results of the Evaluation (Overall Rating D[1])

3.1 Relevance (Rating: ②[2])

3.1.1 Relevance to the Development Plan of Macedonia

The Medium-Term Development Plan ("Macedonia 2003" established in 2000) for the four year period 2000 to 2003 emphasized the need for effective use of limited water resource in Macedonia, and it also listed water shortages during summer months, deterioration of water supply facilities, and a risk of water pollution as issues to be handled by the water sector. The project was a part of the investment in the Public Investment Plan for the period 2002 -2004 to address the above issues.

Although Macedonia does not establish a National Development Plan on a regular basis, and there was no established National Development Plan at the time of ex-post evaluation, the Fiscal Strategy of the Republic of Macedonia (2015-2017) at the time of ex-post evaluation stated that the section on infrastructure development for water was a priority area, and refers to the initiatives to implement Phase 2 and 3 of this project. The Macedonian government established the Water Strategy for the Republic of Macedonia (2012) and set out the sector's basic policy up to 2040. As for drinking water, it aimed to increase the ratio of water pipes connected to households by securing drinking water sources and improving water quality for all users. As for industrial water, policy objectives included: establishing a plan to secure sufficient cooling water and developing and protecting water sources.

At the time of appraisal, the National Development Policy had a policy giving priority to investment in the water sector and this was still a high priority in the budget strategy at the time of ex-post evaluation. At the time of ex-post evaluation, it was the Water Strategy's objective to increase the water pipe connection rate of households, and securing water resource for drinking water was considered to be important in order to achieve this objective.

The project scope was to construct a multipurpose dam, a water treatment plant, and water transmission facilities (water intakes and raw water pipelines) to the water treatment plants. Both at the time of appraisal and the ex-post evaluation, securing water sources was an

[1] A: Highly satisfactory, B: Satisfactory, C: Partially Satisfactory, D: Unsatisfactory

[2] ③: High, ②: Fair, ①: Low

important policy and investment in the water sector had a high priority. The scope of this project matches the country's policy.

3.1.2 Relevance to the Development Needs of Macedonia

At the time of appraisal, the amount of rainfall in the eastern part of Macedonia was 500mm/year, (2/3 of the world average[3] of 880 mm/year) and there were large seasonal variations in rainfall, and water scarcity during the summer was a major issue. Of the project target area, Probistip had a heavy metal mine and a battery factory in the past. The contamination of groundwater was a restricting factor to increase the water supply, though it did not affect the water quality of the Zletovica river. Furthermore, there were occurrences of diseases (such as dysentery) due to the fact that people had to use insanitary water during water shortage season. Unemployment was an issue in the project area due to Macedonia's entry in market-based economy. Promoting employment in new industries and agriculture was intended but water shortage became an obstacle. This project (Phase 1) was an initial phase of a large-scale water source development.

The country's development needs in the eastern region of Macedonia are based on weather conditions and restrictions (such as the area with heavy metal contamination), and there was no change in such development needs at the time of the ex-post evaluation. The amount of rainfall in Stip (the average during the period 2008-2013 was 470.8mm/year) was smaller than other regions (the average in 8 regions is approximately 490~780mm/year) and the project area was one of the most dry areas in the country. As for heavy metal contamination, there was no significant change since no large-scale decontamination work had been implemented. The development needs in the water sector is high and since 2009 the Municipal Service Investment Project has been supporting infrastructure investment in the municipal water supply and sewage system. In addition, since 2010 the European Investment Bank has been providing a sector loan for the water sector throughout Macedonia.

This project was in response to the need for safe drinking water and to help secure water resources which are preconditions for long-term regional development. The objective of this project matched Macedonia's development needs at the time of appraisal and ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

Japan has announced the policy in the "Japan Water Initiative" to continue and strengthen the support through all aid schemes to achieve the goal in water and sanitation as defined in the Millennium Development Goals (MDGs). (Target 7c states that by 2015: The ratio of those who do not have regular access to safe drinking water and sanitation facility will be reduced by 50%). The project constructed a multipurpose dam as well as facilities for water

[3] FAO(2003) "AQUASTAT 2003"

intakes and raw water pipelines in the eastern region of Macedonia which faced issues including water contamination and little rain. The project objective matched Japan's ODA policy, which supports supply of safe drinking water. Furthermore, the Official Development Assistance White Paper in 2003 published by the Ministry of Foreign Affairs emphasized the importance of economic and social infrastructure development in the former Yugoslavia region, focusing on the transition to a market economy, environmental conservation, and support for infrastructure rehabilitation and development in Europe. Macedonia, the target country of this project, belongs to the former Yugoslavia region, matched the geographical importance of Japan's assistance policy.

3.1.4 Appropriateness of the Project

The target area suffers from severe water shortages during summer months, and the outcome of attaining a stable supply of municipal and industrial water would contribute to the project impact related to improving the living standards of residents. Therefore the outcome and the impact of the project are relevant. According to the beneficiary survey of residents of the region where water supply commenced, it was confirmed that the water drawing labor had decreased. The stable supply of industrial water was an essential condition to attract new factories and it could contribute to the long-term industrial development of the area.

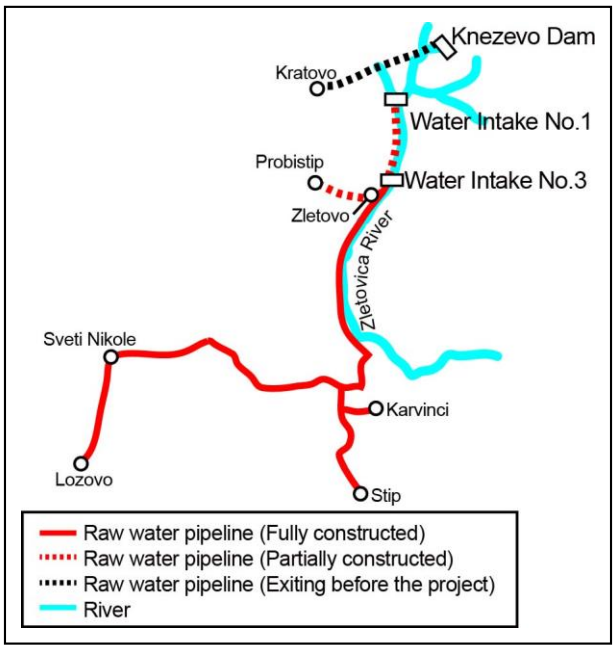


Figure 1: Location of Raw Water Pipelines

On the other hand, the output of this project is not sufficient for incidence of outcome at the time of the ex-post evaluation. Since raw water pipelines from the dam to the water intake was not installed, the water was contaminated with mud at the Zletovica riverbed and water from the tributaries[4]. This resulted in substandard raw water quality and the treatment plants of each municipality need to take a measures to deal with turbidity. Mainly due to high turbidity, there is no water supply in Stip where 50% of the served population in the target area resided at both appraisal and ex-post evaluation. The expected project effects at

[4] Exact data to evidence the finding could not obtained in this evaluation. Given that turbidity at the Knezevo dam was not problematic, PE Hydrosystem "Zletovica", an O&M agency of this project, and the Institute of Public Health which conducts water quality tests concluded that mud at the Zletovica riverbed and water from the tributaries contaminated water quality at the water intake points.

appraisal have not been achieved. The regulation (Regulation for Classification of Water, the Official Gazette of the Republic of Macedonia No.18, 1999) had been applied since 1999. The regulation set the water quality standards which remained the same at the time of the ex-post evaluation. In 2012, PE Hydrosystem "Zletovica" pointed out that the quality of raw water would not satisfy the above standards but this claim did not affect the output of this project.

Water quality tests at the water intake points and the tributaries were not conducted in the feasibility studies and water quality issue was not fully taken into account. If the water quality issue had been understood adequately, necessity of a countermeasure would had been obvious. It is possible to consider that foreseeable risks had been overlooked at the time of appraisal. Although the succeeding project (Phase 3) planned to construct the raw water pipelines from the dam to the water intakes, the construction has not taken place due to some constraints in demand and technical aspects.

In the light of the above, this project was highly relevant to Macedonia's development plan, development needs, as well to Japan's ODA policy; however a part of the project plan was inappropriate, therefore its relevance is fair.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The project outputs are shown in Table 1. The main output changes include the cancellation of the rehabilitation of water intakes, the construction of a pumping station, the extension of raw water pipelines, and the construction and rehabilitation of water treatment plants. According to the Operation and Maintenance (O&M) agency, the rehabilitation of the water intake was abandoned because water supply to Kratovo was commissioned to a private sector entity and the operation of the intake was also transferred to the private sector entity. Since the pumping station was built for supply water directly to the pipeline connected to Kratovo, it is considered that the cancellation of the rehabilitation of water intake did not influence the project effects.

Investment from municipalities necessary for water supply was a precondition of the project, however, the municipal councils kept the water tariff low for final users and it was therefore difficult for municipal water supply utilities to invest by using their internal funds. For this reason, this project has utilized the Japanese ODA loan to develop necessary infrastructure (extension of raw water pipelines, or construction and rehabilitation of water treatment plants) to realize project effects, though it was not included in the original project scope. The existing water treatment plant in Stip needed to be rehabilitated and upgraded before supply of raw water from the dam. The existing raw water pipeline was to be used from the water intake No.1 to Probistip, however a part of the existing pipeline needed to be

newly constructed since it was deteriorated.

Table 1: The Project Outputs

Plan	Actual
Engineering works: • Knezevo dam - Method: Center-core type rock fill dam - Overall water storage volume: 23.5 million m^3 - Dam height: 75m - Dam crest length: 270m - Access road: 9km • Water intake facility - Rehabilitation of water intake: 1 - Construction of water intake: 2 • Raw water pipelines Section: 3 sections, total of 57km (Water intake No.3 to branch point 23km, branch point- Sveti Nikole 23km, branch point - Stip 11km)	Engineering works: • Knezevo dam - Method: Center-core type rock fill dam - Overall water storage volume: 23.0 million m^3 - Dam height: 75m - Dam crest length: 290m - Access road: 20km • Water intake facility - Construction of water intake: 2 - Pumping plant: 1 • Raw water pipelines Section: 7 sections, total of 83 km (Water intake No.3- branch point 22km, branch point – Sveti Nikole 24km, branch point – Stip 11km, Sveti Nikole – Lozovo 11km, Karvinci 5km, Water intake No.1- Probistip 6km, Probistip- Zletovo 3km) • Construction and rehabilitation of water treatment plant[5] - Construction of water treatment plant: treatment capacity 6,480 m^3/day - Rehabilitation of Stip water treatment plant: treatment capacity 43,200 m^3/day
Consulting service: Foreign: 216M/M Domestic: 355M/M	Consulting service: Foreign: 294M/M Domestic: 500M/M

Source: Information provided by JICA, Project completion report, PE Hydrosystem "Zletovica"
Note: Underlined parts are the additional output.

Photo 1: Water Intake No.1

Photo 2: Water Intake No.3

[5] The investment funds are Slovenia grant aid and local state funds in addition to the Japan's ODA loan.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual project cost amounted to 12,692 million yen against the planned cost of 13,174 million yen. However, if the cost related to the construction and rehabilitation of water treatment plants (154 million yen) is deducted from the actual cost (as it was not originally included in the planned cost), the adjusted actual cost was 12,538 million yen. The adjusted project cost was within the plan as compared to the planned cost (95% of the planned cost). The project cost decreased because price competitive Macedonian companies won the engineering works (access road, dam, water intakes, pipelines). While the Japanese ODA loan was eligible for civil works, procurement of equipment, consulting service, and physical contingency, the Macedonian government was responsible for financing administration cost, land acquisition cost, and tax.

3.2.2.2 Project Period

The actual project period for the original output was from November 2003 till December 2012 while that for the revised output which included additional construction and rehabilitation of water treatment plant was from November 2003 till July 2014. For the precise comparison between the planned and actual project periods for the same output, the planned and actual project periods for the original output were compared in this report. As a result, the planned project period was 80 months (from November 2003 till June 2010) whereas the actual project period was 110 months (from November 2003 till December 2012) as mentioned above which exceeded the plan (138% of the period planned). The reasons for the delay were as follows: (1) There was a delay in the procurement of construction supervision consultant and that of dam construction as the executing agency was not familiar with procurement procedures of Japanese ODA loan, and (2) The construction period was extended.

The service commencement of the construction supervision consultant was December 2004, which was a 6 months delay from the plan (May 2004). The commencement of the construction was moved forward by making the access road an independent procurement package and by using local competitive bidding (LCB) for more simple procedures. Nevertheless, the procurement of the dam construction and the construction period took longer, and resulted in the delay in project completion. The delay in progress of construction works was caused by (1) a design change (location of spillway, etc.) and (2) an insufficient construction plan of the company in charge. While the planned construction period was from July 2006 to June 2010 (48 months), the actual construction period was from September 2005 to December 2012 (87 months).

3.2.3 Results of Calculations of Internal Rates of Return (Reference Only)

The actual Financial Internal Rate of Return (FIRR) was -2.4% against the estimate of 1.3% (See Table 2 for calculation conditions). There are two main causes for the FIRR falling below the estimate: (1) Decreased sales volume of unsupplied industrial water, and (2) Lower sales prices than estimated at the time of appraisal. According to sales projections made by PE Hydrosystem "Zletovica", despite an increase in sales volume after 2015, the sales volume of 2029 remained approximately 40% of the initial estimate. At the appraisal the raw water price during the project period was estimated to be 15MKD[6]/m^3. At the time of ex-post evaluation, however, in 2014 it was estimated to be 3.12MKD/m^3 in 2014 and it was estimated to be 14.02MKD/m^3 in 2029 (all the unit price is the actual price). The actual Economic Internal Rate of Return (EIRR) was 3.0% against the estimate of 7.1%. The cause for the EIRR falling below the estimate was mainly the sales volume which also fell below the estimate. No sensitivity analysis was conducted for both FIRR and EIRR at the time of appraisal and the influence that major changes in parameters could have on investment efficiency was not analyzed.

Table 2: Conditions for Calculation of Internal Rates of Return at the Time of Ex-Post Evaluation

	FIRR	EIRR
Cost	Project cost, O&M cost	Project cost, O&M cost
Benefits	Raw water sales income (municipal water)	Water supply stabilization, resolving water shortage, cost reduction effects
Project Period	27 years	50 years
Preconditions	● O&M cost was added after non-capital cost was subtracted from operating cost for 2013. No increase is expected since O&M is mostly inspections and cleaning. ● The sales volume of raw water is based on the sales projection of an O&M agency. Although the sales volume will reach 8 million m^3 in 2029, the sales of industrial water will not be projected. ● The remaining value (2,172 million MKD) was added during the final year of the project life based on depreciation period (23 years remaining) as at the appraisal. ● The nominal raw water price after 2015 was expected to increase 1MKD/year (based on the hearing from the O&M agency). ● The cost was calculated with the actual price at appraisal. For accurate comparison, the nominal price was recalculated and adjusted based on CPI (Consumer Price Index) as an inflation rate and converted to the actual price.	● The items with no sufficient data (price unit of each benefit, water shortage volume) used the preconditions at the time of appraisal. ● The rate of water leakage was estimated to decrease from 46% in 2000 to 28.1% in 2025 based on the preconditions at the time of appraisal. There was no estimate given after 2025 at the time of appraisal, however, a downward trend of approximately 10% (referred to the water leakage rate of Moscow) is expected. ● The demand forecast used the same preconditions as FIRR until 2029, and then the prepositions at the time of appraisal after 2030. There is no benefit estimation related to industrial water. ● The conversion factor from financial price to economic price was estimated to be 0.85 times as the time of appraisal. ● The cost was calculated with the actual price at appraisal. For accurate comparison, the nominal price was recalculated and adjusted based on CPI as an inflation rate and

[6] MKD stands for Macedonian Denar.

	FIRR	EIRR
		converted to the actual price.

In the light of the above, the project cost was within the plan but the project period slightly exceeded the plan; therefore the efficiency of the project is fair.

3.3 Effectiveness[7] (Rating: ①)

Upon analyzing the project effectiveness, there was an intervention theory with the hypothesis that the project outcomes brought about by the stable raw water supply would result in an increase in served population as well as an improvement in water supply coverage. The evaluation of project effectiveness and impacts were made based on analysis of quantitative effects (supply volume and sales income of raw water) that were directly related to the above outcomes, and at the same time, the water quality which was an intermediate outcome to influence the target of supply volume. Qualitative analysis of project effects focuses on the incidence of projects effect in the target area, analyzes the usage conditions and stability of the water supply service as outcome, and shows the improvement in sanitation and living standards caused by water supply service as impacts.

3.3.1 Quantitative Effects (Operation and Effect Indicators)

(1) Supply Volume and Revenue of Raw Water

There were seven municipalities including Stip, Probistip, Sveti Nikole, Zletovo, Lozovo, Karvinci, and Kratovo listed as the target area for water supply at the appraisal. However at the time of the ex-post evaluation, water supply was implemented only in Probistip (except for the former Zletovo area in Probistip) and Sveti Nikole. Although the water treatment plant in Stip was completed in July 2014, the municipal water supply utility has not received water supply mainly due to the high turbidity of the raw water during the test operation immediately after the completion. As

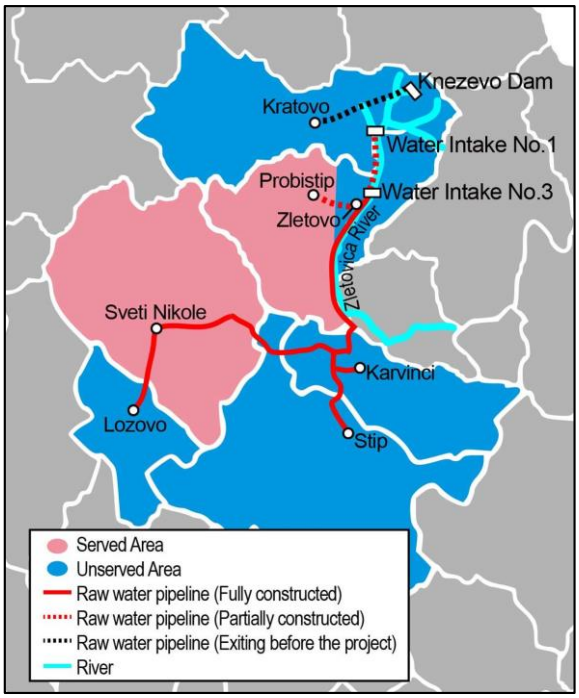


Figure 2: Served Area

[7] Sub-rating for Effectiveness is to be put with consideration of Impact.

of March 2015, a trial supply to the water treatment plant in Stip was expected to start soon; at least 3-4 months of trial period would be followed by full water supply as long as there were no issues but its supply commencement has not officially been determined[8]. The water supply is planned to start during 2015 in the former Zletovo area, and Lozovo is considering to take supply from Sveti Nikole. Although there is a water treatment plant in Kratovo, the municipality has not experienced water shortage for the past few years, therefore they have no plan to purchase raw water. There is no ongoing construction of a water treatment plant in Karvinci, therefore the water supply commencement period is not determined. Since the water supply for Stip, which accounts for almost 50% of the population in the target area at the time of the ex-post evaluation, has not yet been commenced, the amount of raw water supply remained approximately 20% of the planned target.

Table 3: Raw Water Supply Volume and Sales Revenue

	Baseline	Target	Actual	Actual	Actual
	2003	2012	2012	2013	2014
	At appraisal	Two years after project completion	The year of project completion	One year after project completion	Two years after project completion
Raw Water Volume (for Municipal Water)	NA	11,276,000 m^3	NA	2,183,000 m^3	2,377,000 m^3
Raw Water Sales Revenue	NA	179 million MKD	2.9 million MKD	6.5 million MKD	9.5 million MKD
Municipal Water	NA	112 million MKD	2.9 million MKD	6.5 million MKD	9.5 million MKD
Industrial Water	NA	67million MKD	No Sales	No Sales	No Sales

Source: Information provided by JICA, PE Hydrosystem "Zletovica"
Note: The term, "project completion" used in the Table means the completion of the original output. Thus the Table shows the comparison between the target and actual values after the completion of the same original output. As per the published ex-ante evaluation, the originally set target value was assumed to be achieved by the time, 5 years after the project completion. However, for the evaluation purpose, the target value to be achieved by the time, 2 years after the project completion (in 2014) was deduced and the deduced value was compared with the actual value of the same year.
Raw water was supplied to Sveti Nikole prior to the project completion which was December 2012.

The sales revenue of raw water was significantly below the plan as the sales volume was lower than planned and the sales price was also low. In addition to the low volume of municipal water, there was no industrial water sales. The sales of industrial water was expected in two locations (Stip and Probistip) at the time of appraisal. The demand for industrial water, however, was not sufficient at the time of the ex-post evaluation, therefore the water utility in Stip has no specific plan for supply of industrial water. During the feasibility studies of this project, there was no regional development plan to be used for

[8] According to the letter from the executing agency dated on July 23, 2015, a test supply has begun since April 2015 and the water utility in Stip is expected to accept the supply of raw water after the completion of the test. However the evaluation judgment is based on the result of interview with the municipal water supply utility, a beneficiary of raw water supply.

demand forecast of industrial water and the difficulty with estimating the industrial water was pointed out. At the appraisal, the sales price for both municipal and industrial water was estimated to be 15MKD/m^3 but the actual raw water price for the municipal water in 2014 remained as low as 4MKD/ m^3.

With the assumption that the source of municipal water in Stip is switched completely from ground water to the supply of PE Hydrosystem "Zletovica" after 2016, raw water volume for Stip, Probistip, and Sveti Nikole is expected to be 6,350,000 m^3 (forecasted served population for 2016 is 76,415[9] and actual raw water volume was 83.1m^3/person[10]) for 2016. In addition, raw water sales revenue is estimated 32 million MKD (forecasted raw water price is 5 MKD/ m^3[11]) for 2016. Raw water sales revenue would be approximately 20% of the target for 2012 even in the above case since the sales of industrial water is not expected in 2016 and raw water price is below the forecasted price in the original plan.

(2) Water Quality

The objective on water quality at the appraisal was to meet Macedonian standards at routine testing. The quality of water was classified into five categories (radiation, substances/chemicals, pesticides, parasites, microorganisms) and the quality level is set from Class I to Class V on each category based on the regulation (Regulation for Classification of Water, the Official Gazette of the Republic of Macedonia No.18, 1999) at the time of the ex-post evaluation. Since raw water supplied from the Knezevo dam is used as drinking water, it is required to be classified in Class I or Class II in all categories (See Table 4 for description of each class). The results of routine testing in June and December 2013 revealed that the water quality of the water intake No.1 and No.3 had parameters which did not fulfill the standards for substances/chemicals and microorganisms (See Table 5). Throughout the year, E. coli is abundant in the water intakes No.1 and No.3. As explained in the footnote No.5, the water quality tends to worsen in downstream areas because mud at the Zletovica contaminates raw water and the tributaries flows into raw water. Although turbidity is not usually a concern, for the above reason it tends to reach higher levels after rains. Water outages occur in the Probistip water treatment plant as the treatment operation automatically stops when the turbidity reaches a high level. In the water treatment plant in Sveti Nikole, in response to high turbidity a high usage of chemicals has increased water loss during the treatment process. For this reason, the municipalities strongly demand for improvement of water quality.

[9] This figure is estimated from the data provided by the municipalities on actual served population in Stip, Probistip, and Sveti Nikole for 2014 and that of the growth rate of served population from 2000 to 2014.

[10] Based on actual raw water volume for 2014 (data source: PE Hydrosystem "Zletovica" and actual served population in Probistip and Sveti Nikole for 2014 (data source: the municipalities).

[11] Based on the forecast of PE Hydrosystem "Zletovica"

Table 4: Classification of Water Quality

Classification	Use
Class I	In its natural state, it can be used for drinking, production and processing of food product, suitable for cultivation of noble types of fish (salmonid species).
Class II	In its natural state, it can be used for bathing and recreation, water sports, production of other types of fish (cyprinid species), or after usual methods of purification for drinking, which can be used for production and processing of food products.
Class III	In its natural state, it can be used for irrigation, and after usual purification methods, for industries which do not need drinking water quality.
Class IV	In its natural state, it can be used for other purposes only after certain processing.
Class V	In its natural state, it cannot be used for any purposes.

Source: Regulation for Classification of Water, the Official Gazette of the Republic of Macedonia No.18, 1999

Table 5: Results of Water Quality Assessment

	Knezevo Dam		Water Intake No.1		Water Intake No.3	
	6/2013	12/2013	6/2013	12/2013	6/2013	12/2013
Radiation	Class I	Class I	Class I	Class I	Class I	Class I
Substances/ Chemicals	Class I	Class IV	Class I	Class IV	Class I	Class V
Pesticides	Class I	Class I	Class I	Class I	Class I	Class I
Parasites	Class I	Class I	Class I	Class I	Class I	Class I
Microorganisms	Class IV	Class I	Class IV	Class IV	Class IV	Class IV
Parameters that did not fulfill Class II	E. coli	Iron, manganese, nitrite nitrogen	E. coli	Iron, potassium permanganate consumption, E.coli	E. coli	Turbidity, potassium permanganate consumption, E. coli

Source: Institute of Public Health

In regards to the water quality of tap water, water quality standards are based on the Regulation on Water Safety, Official Gazette of the Republic of Macedonia No.46, 2008. According to the water quality inspection of tap water in Probistip and Sveti Nikole by the Institute of Public Health, standards are defined for 24 out of 33 parameters (color, turbidity, potassium permanganate consumption, ammonia, heavy metals, etc.). During the scheduled inspections in 2013 and 2014, all parameters fulfilled the standards for drinking water. Although some parameters of the raw water did not satisfy their standards, the quality of tap water in both towns were appropriate with proper treatment.

3.3.2 Qualitative Effects (Other effects)

(1) Current status of service water usage

At the time of the ex-post evaluation a beneficiary survey was conducted by PE Hydrosystem "Zletovica" in two municipalities that received raw water. Residents of 100 households from the target area (50 households from each of Probistip and Sveti Nikole) were surveyed.

Table 6: Water Source for Domestic Water at the Time of the Ex-Post Evaluation

		Water Tap	Community Water Tap	Well	Other	Total
What is the water source for domestic water?	Response	97	1	1	1	100
	%	97.0%	1.0%	1.0%	1.0%	100.0%

Source: Beneficiary survey

The results of the survey indicated that at the time of the ex-post evaluation the local residents of the region used tap water as a main water source several times a day. Most respondents in the target area (97%) considered the water pipes connected to their houses as a primary water source (See Table 6). In addition, most households (99%) used tap water several times a day (See Table 7). Those households which did not use the water pipes as their primary water source also used tap water to some purposes such as laundry, bath, and toilet.

Table 7: Frequency of Water Tap Usage

		Several times a day	Once a day	Several times a week	Once a week	Do not use it	Total
How often do you use the water tap?	Response	99	1	0	0	0	100
	%	99.0%	1.0%	0.0%	0.0%	0.0%	100.0%

Source: Beneficiary survey

(2) Frequency of Water Outage

From the beneficiary survey mentioned above, a total of 56% respondents answered that the frequency of water outage has "decreased" or "decreased significantly", whereas compared to 5 years ago (before the water supply service started), 36% answered that the frequency has "increased" or "increased significantly" (See Table 8). The statistical test showed that frequency of water suspension was reduced in Sveti Nikole but it was not reduced in Probistip. Certain number of residents felt that the frequency of water outage has increased, though the malfunction of distribution pipes should be taken into account as well. Of 36 residents who answered that the frequency has "increased" or "increased significantly", 24 of them were from Probistip. The number of water outage within the past year averaged 4.22 times in all areas whereas the average in Probistip was 4.98 times. At the water treatment plant in Probistip, filtration process stopped when the turbidity of water was high. This may have led to the relatively high frequency of water outage.

Table 8: Frequency of Water Outage

		Increased significantly	Increased	No change	Decreased	Decreased significantly	Total
Do you experience water outage more frequently than 5 years ago?	Response	28	8	8	25	31	100
	%	28.0%	8.0%	8.0%	25.0%	31.0%	100.0%

Source: Beneficiary survey

3.4 Impacts

3.4.1 Intended Impacts

(1) Water service penetration rate and served population of water supply

Although the water service penetration rate and served population are increasing, it has not reached the targets set at the appraisal (See Table 9). While an increase of served population (target minus baseline) was expected to be 17,258 people at the appraisal, the increase of served population reached 6,051 people (35% of the target). In 2014, the Knezevo dam built by this project supplied water to two municipalities (Probistip and Sveti Nikole) out of seven municipalities that were planned to be supplied water at appraisal. The increase in the served population in Probistip and Sveti Nikole between 2000 and 2014 (1,532 people) was equivalent to 30% of the overall increase in the target area of the said time, therefore it is considered that the project has contributed to the water service penetration rate and served population to some extent. Nevertheless, the served population of the two municipalities (28,599 people) still accounted for just 30% of the total served population (88,299 people) of the area which were planned to be supplied water at appraisal.

Table 9: Water Service Penetration Rate and Served Population for Project Target Area (7 Municipalities)

	Baseline	Target	Actual	Actual	Actual
	2000	2012	2012	2013	2014
	F/S Implementation	Two years after project completion	The year of project completion	One year after project completion	Two years after project completion
Water service penetration rate	81.5%	95.3%	NA	NA	89.9%
Served population	82,248	99,506	NA	NA	88,299

Source: Information provided by JICA, hearing from each municipality

(2) Behavioral changes and sanitary conditions

The above-mentioned beneficiary survey indicated that after the project completion there were some behavioral changes among the beneficiaries. As a result of being able to obtain safer water, approximately half of the respondents said the frequency of dish washing and hand washing have "increased significantly" or "increased" as compared to 5 years ago before the water supply commencement (See Table 10).

Table 10: Frequency of dish washing, hand washing and diarrhea

		Increased significantly	Increased	No change	Decreased	Decreased significantly	Total
Do you wash dishes more frequently than 5 years ago?	Response	21	30	49	0	0	100
	%	21.0%	30.0%	49.0%	0.0%	0.0%	100.0%
Do you wash hands more frequently than 5 years ago?	Response	24	29	47	0	0	100
	%	24.0%	29.0%	47.0%	0.0%	0.0%	100.0%
Do you have diarrhea more frequently than 5 years ago?	Response	0	2	52	3	43	100
	%	0.0%	2.0%	52.0%	3.0%	43.0%	100.0%

Source: Beneficiary survey

The percentage of people who answered that the frequency of diarrhea has "not changed" was 52%, and those who said that the frequency has "decreased significantly" or "decreased" was 45%. In the target area for water supply, some behavioral changes were seen among residents and very few respondents who reported to have experienced a higher frequency of diarrhea, and approximately half of them acknowledged some reductions. Since sanitary conditions could have improved for other causes, it is difficult to identify specific reasons behind the reduction of diarrhea. Thus, it cannot be determined that these results were solely caused by the project. Nevertheless, it was plausible that the project had contributed to the results to some extent because of the behavioral changes.

(3) Labor time of drawing water

From the beneficiary survey, it can be interpreted that the time for water drawing labor has been decreasing. Of all the respondents, 45% reported that time of water drawing labor has "decreased significantly" or "decreased", and no respondents said it has "increased significantly" or "increased" (See Table 11). Even those who said the frequency of water outage has increased also responded that the time of water drawing labor has decreased, and it is inferred that long-term water outages that required water drawing labor has been decreased. Interviews to individuals revealed that prior to the implementation of this project, some beneficiaries used public water taps of other areas or neighbor's well when water outage was prolonged.

Table 11: Labor Time of drawing water

		Increased significantly	Increased	No change	Decreased	Decreased Significantly	Total
Has the labor time of drawing water increased compared to 5 years ago?	Response	0	0	55	18	27	100
	%	0.0%	0.0%	55.0%	18.0%	27.0%	100.0%

Source: Beneficiary Survey

3.4.2 Other Impacts

(1) Improvement in manufacturing and service industries

PE Hydrosystem "Zletovica" does not sell industrial water. However, PE Hydrosystem

"Zletovica provides raw water to the state-owned water supply utilities and, then, each state-owned water supply utility provides municipal water to large users. From individual interviews of large users, it was appraised that the use of water facilities (shower, bath) became more stable at a hotel in the water supply area. In addition, drained water from the water treatment plant is used for drilling and ore dressing at mines in the target area. In addition to using underground water and rainwater, the mining company purchased water during summer months when water resources run short. Obtaining stable water supply contributed to the stabilization of mining operation.

(2) Impacts on the Natural Environment

Environment safeguards were implemented based on an environmental monitoring and management plan during the project implementation. In particular, setting the construction period to minimize soil erosion, management of garbage and industrial wastes, noise and vibration countermeasures, and monitoring of flora and fauna were implemented. In addition, fishways were made in the water intakes under the design with an attention to migration of fish. Regulations make it necessary to protect the natural environment of water resource, and the Ministry of Environment and Physical Planning conducts inspections of protected areas. At the time of the ex-post evaluation, the ministry gave no indication of negative impacts on the natural environments surrounding the dam. In addition, no negative impacts on the natural environment was found during the site assessment for this evaluation.

(3) Land Acquisition and Resettlement

No resettlement was required because there were no residents in the planned submergence area of the dam at the time of appraisal. Land acquisition took place in accordance with Macedonian regulations, and the area of land acquisition was 107.4 ha and that of temporary land lease was 45.5 ha.

In the light of the above, the project achieved its objectives at a limited level. Therefore effectiveness/impact of this project is low.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

During the project implementation, the Ministry of Agriculture, Forestry and Water Economy was the executing agency of this project while PE Hydrosystem "Zletovica" was in charge of practical matters of project implementation. After the project completion, PE Hydrosystem "Zletovica" took charge of O&M of the facilities as well as sales of raw water to state-owned water supply utilities. PE Hydrosystem "Zletovica" negotiates with the state-owned water supply utilities to set the tariff for raw water, and establishes annual

management plans. The management plan is then approved by the cabinet in consultation with relevant government ministries (Ministry of Finance, Ministry of Agriculture, Forestry and Water Economy, and Ministry of Environment and Physical Planning).

PE Hydrosystem "Zletovica" was established in June 2001 in order to implement the project and take charge of O&M of the facilities to supply raw water after the completion of the project. There were nine staff members as of 2002. At the time of the ex-post evaluation, PE Hydrosystem "Zletovica" consisted of the Technical Department, General and Legal Affairs Department, Economy and Finance Department, and Internal Audit Unit. Staff from the Technical Department directly engaged in the O&M of constructed facilities. As of December 2014, there were 29 staff members at PE Hydrosystem "Zletovica", of which six were managers, six were engineers or technicians, seven were administrative staff and ten were general workers.

The O&M of water treatment plants were managed by the water supply utilities in Stip and Probistip at the time of the ex-post evaluation. There is a total number of 332 staff members at the water supply utility in Stip, and 70 of them work in the water sector. At the water treatment plant in Stip, there are three work shifts and one staff member in each shift who specializes in the electric and machinery field and the chemical field. There is a total number of 91 staff members at the water supply utility in Probistip, and approximately 20 of them are allocated to the water sector. No staff is stationed at the water treatment plant in Probistip as it is fully automated but there is a work arrangement that ensures at least three staff members to be present in case of emergency.

The responsibility of O&M for the facilities developed by this project is clearly defined. The number of staff members at PE Hydrosystem "Zletovica" has increased as compared to the time of appraisal, and there is no shortage of staff to take charge of O&M. There are enough staff members allocated for daily operations at the water treatment plants in Stip and Probistip.

3.5.2 Technical Aspects of Operation and Maintenance

Recruitment of PE Hydrosystem "Zletovica" is based on Macedonia's civil servant regulation and under such regulations workers are required to have experience in the relevant fields. Technical staff have participated in a seminar on large-scale dam management as well as other seminars conducted by the Government of Macedonia related to regulations. At interviews at PE Hydrosystem "Zletovica", some officials suggested that advanced use of SCADA was not possible and therefore it would be desirable to allocate engineers who are experts on SCADA. There was a high demand for trainings for SCADA. There is an O&M manual for major facilities such as dams, water intakes, pipelines, and SCADA. The manuals developed by contractors were written in English, and essential sections were translated into Macedonian. According to the briefing by the executing agency, they have developed a plan

for equipment inspection and maintain records for repair works.

Both the water supply utilities in Stip and Probistip had operational experience f water treatment plants prior to the implementation of the project, therefore they had technical knowledge that was required for operation. In addition, manuals were developed in Macedonian. In regards to the purification filter, there was a five-year warranty period from its completion, and technical advices were available from a contractor at the time of the ex-post evaluation.

Based on recruitment standards, training content, and preparation of manuals, it is considered that staff members of the government agencies involved in O&M have acquired essential technical knowledge for daily operation.

3.5.3 Financial Aspects of Operation and Maintenance

At the time of the ex-post evaluation, there was no regulation on tariff for raw water; hence PE Hydrosystem "Zletovica" set the tariff by negotiating with each water supply utility. PE Hydrosystem "Zletovica" submits a tariff proposal to the cabinet who then makes a final decision on the tariff. The sales price of raw water was 3MKD/ m^3 in 2012-2013, and 4MKD/m^3 in 2014-2015. PE Hydrosystem "Zletovica" plans to gradually raise the price to 5MKD/ m^3 in 2016, and 1MKD per year thereafter.

Table 12: Sales and Operation Costs of PE Hydrosystem “Zletovica”

Unit: MKD

	2011	2012	2013
(A) Sales	7,038,066	9,853,313	9,781,371
(B) Operation cost	32,572,740	157,611,786	86,371,978
(A)-(B) Sales revenue	-25,534,674	-147,758,473	-76,590,607
(C) Operation cost excluding non-fund cost	3,447,095	5,615,698	10,312,003
(A)-(C) Balance	3,590,971	4,237,615	-530,632

Source: PE Hydrosystem “Zletovica”

Although PE Hydrosystem "Zletovica" had been experiencing an operating loss at the time of the ex-post evaluation, it was mostly due to their non-cash costs (reassessment of asset price and depreciation), hence when these items were removed, sales and operation costs balanced out each other (See Table 12). The O&M cost (excluding staff salary) which the company defrayed was 196,000 MKD in 2012 and 229,000 MKD in 2013. After the completion of original output, the Ministry of Agriculture, Forestry and Water Economy has been providing financial support for a part of current expenditure (studies, etc.), new investment, and repayment (both capital and interest) of subleased Japanese ODA loan (See Table 13). It is considered that PE Hydrosystem "Zletovica’s" revenue is enough to secure essential O&M costs but it is not enough to cover the cost of rehabilitation or reinvestment. The Macedonian Government, however, has shown an interest in a subsequent project and intends to raise investment funds through multilateral development banks. It is likely that the

financial support will be continued in order to secure financial stability for the subsequent project.

Table 13: Financial Support for PE Hydrosystem "Zletovica"

Unit: MKD

	2012	2013
Goods and service purchase	5,000,000	5,000,000
Loan interest payment	75,250,000	75,300,000
Facility investment	55,000,000	84,000,000
Loan capital payment	306,890,000	318,710,000
Total	442,140,000	483,010,000

Source: Ministry of Agriculture, Forest and Water Economy

Table 14: Water Tariff of the Target Water Supply Regions

Unit: MKD/ m^3

	Household	Legal Entity
Stip	29.5	47
Sveti Nikole	31	47
Probistip	28	55

Source: Interviews for the ex-post evaluation

The state owned water supply utilities prepare a water tariff proposal based on a certain formula, and obtain approval from municipal councils. However, it is difficult to obtain approval from the councils and tariff revisions are not implemented frequently. The water tariff in the water supply area as of December 2014 is shown in Table 14.

The net income of the water sector for 2013 in Stip was in surplus (29,249,764 MKD) and in Probistip was in loss (-5,343,728 MKD). As price pass-through to final users under the current tariff system is not possible, it is difficult for the state-owned water supply utilities to accept a significant increase in raw water price.

With the support from the European Union, there is an ongoing reform such as establishment of an independent supervisory body which would take charge of water tariff revisions, introduction of water tariff setting procedures to cover supply of raw and municipal water and sewage service. The Ministry of Environment and Physical Planning plans to establish a supervisory body in December 2015 and to change the tariff system of a large-scale utility from 2018. The water tariff is planned to be set such that O&M costs and small-scale investments (new pipe installation, etc.) can be recovered even with the lowest tariff. If this reform is implemented, the tariff approval process from municipal councils is not required anymore and it is possible to set a water tariff that can recover investments with approval from the supervisory body.

There are minor financial issues. Since the tariff for raw water was kept low, the profitability of PE Hydrosystem "Zletovica" is barely enough for O&M and requires the Ministry of Agriculture, Forestry and Water Economy to provide financial support. Although water tariff reform is in progress, a significant increase of tariff for both raw and municipal water cannot be expected due to difficulty in price pass-through to final users.

3.5.4 Current Status of Operation and Maintenance

No damage was found on the dam, the water intakes, and the equipment during the site visit because just a few years passed after the project completion. Inspections and cleaning of the facilities required for routine operation are undertaken appropriately. The current status of the facilities developed by this project is shown in Table 15.

Table 15: The current status of the facilities developed by this project

Facility	Current Status
Dam, water intakes	Visual inspections are implemented 3-4 times weekly. There are monthly detailed inspections by engineers as well as an annual inspection to follow up the monthly inspection items with executives. More frequent inspections and cleaning take place during autumn when fallen leaves often block the water intakes.
Access road	Countermeasures for a landslide is required, therefore maintenance with heavy machineries is implemented as necessary. There was no traffic obstacle at the time of site assessment.
Raw water pipelines	According to the O&M agency, they drain water and wash off dirt at least once a year. Technical specifications of a drainage valve shaft were changed as some defects were found at the time of project implementation. At the time of the ex-post evaluation, rehabilitation of the section (from a junction to Sveti Nikole) constructed based on former specifications was implemented with the budget of the Ministry of Agriculture, Forestry and Water Economy.
SCADA	There are no data or items (flow volume, water temperature, facility video monitor, etc.) that cannot be monitored, and no defect is reported. The staff acknowledged that although they are acceptable for daily use, they are not yet to be applied in a higher level.
Water treatment plants	A Slovenian company supplies the equipment, and it handles technical inquiries from the water supply utilities. There is no problem obtaining replacement parts or chemicals.

Source: Site assessment during evaluation study, hearing assessment

Photo 3: Access Road

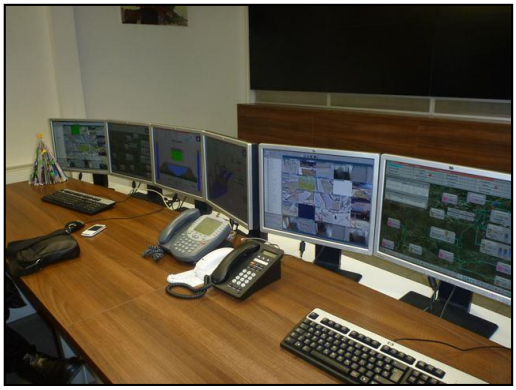


Photo 4: SCADA

In the light of the above, some minor problems have been observed in terms of the financial aspects of the O&M in this project. Therefore sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of this project was to stabilize the supply of service and industrial water by the construction of a multipurpose dam, water intakes, and raw water pipelines in the eastern part of Macedonia, thereby contributing to the improvement of living among residents and the

promotion of industry in the region. This project is in line with the Macedonian national development policy and their development needs as well as Japan's ODA policy. However, the project scope was not defined appropriately as water quality tests at the water intake points and the tributaries were not conducted. The output of this project was not sufficient for incidence of outcome and, therefore, the relevance of the project is fair. The efficiency of the project is fair. Although a price competitive Macedonian company undertook the engineering work and the project cost was less than planned, the project period exceeded the plan due to a delay in the procurement and an extended construction period. Also, although a piped water system is in use at the target area, and there have been improvements in sanitary conditions and life convenience; the coverage of this project is limited and the raw water supply volume and revenue from raw water sales are significantly below the plan. Furthermore, as there are no raw water pipelines installed in the upstream area, the water quality has tended to worsen and therefore water supply service to municipalities with large populations has not yet commenced. For the above reasons, the effectiveness/impact of this project is low. Although the revenue of PE Hydrosystem "Zletovica" can ensure the minimum level to finance O&M activities, it will be difficult to recover the investment cost and it is unlikely that revenue to cover rehabilitation can be secured and, therefore, the sustainability is fair.

In light of the above, this project is evaluated to be unsatisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Since water supply to Stip has not commenced due to high turbidity, the incidence of benefit is geographically limited. Water quality is likely to meet the standards in the future if Phase 3 (a subsequent project which was expected to be undertaken at the time of appraisal) is implemented. At the time of the ex-post evaluation, however, funding for Phase 3 had not been obtained. If implementation of Phase 3 remains difficult in near future, it is recommended that the executing agency assess a smaller size investment to solve the water quality issue (such as installation of sedimentation tank).

4.2.2 Recommendations to JICA

It is desirable to monitor actions to cope with water quality issue and, if appropriate, influence relevant agencies to take necessary actions. Although available resources are limited, it is desirable to consider continuing technical advice.

4.3 Lessons Learned

- Adequate testing of raw water quality and defining appropriate project scope

As the scope of this project did not include a raw water pipeline in the upstream area, substandard quality of raw water resulted in unrealization of expected outcomes. As water

quality tests at the water intake points and the tributaries were not conducted adequately, no assessment was made on water quality to be achieved under the project scope. For a project to provide raw water to water treatment plants, it is desirable to assess raw water quality to be achieved under the project scope in light of water quality standards at a project area and users' needs and, then, to define a project scope or expand a project scope in a project implementation phase in consideration of the assessment result.

- Countermeasures in the case that price pass-through to final users is difficult

If the price of raw water was set high enough to ensure the financial stability of PE Hydrosystem "Zletovica", (the state-owned enterprise in charge of O&M), the water supply utilities in the target municipalities would face difficulties in price pass-through to final users by raising tariffs and suffer from worse financial performance. Although the issue was well recognized at the appraisal, subsidies and measures to improve collection of receivables were assessed in the feasibility study, the institutional and political feasibility of these measures were not assessed. If price pass-through to final users is difficult, it is desirable to not only recommend policy measures but also assess the feasibility of such measures and encourage executing agencies to implement feasible measures.

- Discussion for risk identification and demand projections management

Industrial water (which makes up 40% of overall raw water sales) was not provided by the project and revenue sources to carry out rehabilitation or investments were not secured, hence project effects related to industrial water supply did not occur. Insufficient demand was behind unsupplied industrial water. At the appraisal, there was no regional development plan that could be grounds for demand projections of industrial water, and it was pointed out that accurate projection was difficult. On the other hand, the sensitivity analysis was not conducted in IRR analysis, and risks on the project's effects and profitability caused by unrealization of demand projections were not clearly understood. At the appraisal, it is desirable to decide on project implementation after carrying out sensitivity analysis and reviewing several demand scenarios in light of accuracy of demand projections.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	Engineering works: • Knezevo dam - Method: Center-core type rock fill dam - Overall water storage volume: 23.5 million m^3 • Water intake facility - Rehabilitation: 1 - Construction: 2 • Raw water pipelines - Section: 3 sections Total 57km Consulting service: Foreign: 216M/M Domestic: 355M/M	Engineering works: • Knezevo dam - Method: Center-core type rock fill dam - Overall water storage volume: 23.0 million m^3 • Water intake facility - Construction: 2 - Pumping facility: 1 • Raw water pipelines - Section: 7 sections Total 83 km • Construction and rehabilitation of water treatment facility - Construction: Treatment capacity 6,480 m^3/day - Rehabilitation: Treatment capacity 43,200 m^3/day Consulting service: Foreign: 294M/M Domestic: 500M/M
2. Project period	November 2003 - June 2010 (80 months)	November 2003 - December 2012[12] (110 months)
3. Project Cost		
Amount paid in Foreign currency	4,993 million yen	7,020 million yen
Amount paid in Local currency	8,181 million yen (Local currency 3,636 million MKD)	5,672 million yen (Local currency 2,602 million MKD)
Total	13,174 million yen	12,692 million yen[13]
Japanese ODA loan portion	9,689 million yen	9,685 million yen

[12] The year of project completion is the completion year of the original project output. Construction and rehabilitation of water treatment facilities which were not included in the original project output were completed in July 2014.

[13] This figure is the total project cost for the original output. The information on the total project cost that includes the additional output is not available.

Exchange rate	1MKD = 2.25 yen (As of May 2003)	1MKD = 2.18 yen (Average between January 2003-December 2012)

Middle East and Europe Department and Balkan Office,
Japan International Cooperation Agency

Opinion of JICA Operations Department on Ex-post Evaluation of "**Zletovica Basin Water Utilization Improvement Project**"

[Turbidity level and impact thereof] (Relating to p. 10-12 of the Ex-post Evaluation Report)

The Public Enterprise Hydro-System Zletovica, a supplier of raw water, has exchanged contracts with various municipal corporations that are to receive the water. However, according to JICA's interview with the executing agency, some of the corporations accept the raw water, while others do not, even though the water quality is the same. Consequently, it is unclear whether or not turbidity is a reason why raw water is not being supplied to each municipality in accordance with the plan. Thus, to objectively evaluate and analyze the extent of turbidity based on annual turbidity data and its impact, JICA has requested that the executing agency conduct water quality tests and consider countermeasures based on the results (the executing agency is currently conducting water quality tests at 10 locations, including water intakes).

[Supply of raw water to the Municipality of Stip] (Relating to p. 22 of the Ex-post Evaluation Report)

In August 2015, JICA conducted an interview with the local partners (the executing agency and Public Enterprise Hydro-System Zletovica) about this matter. According to the local partners, the reason why water is not being supplied to the Municipality of Stip (where around a half of project beneficiaries reside) is that municipality's water treatment plant has not been fully operational though it has started on a trial basis. JICA plans to continue to monitor the status of raw water supply to Stip once it becomes fully operational.

(End)