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JAPAN INTERNATIONAL COOPERATION AGENCY

THE GOVERNMENT OF THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA
MINISTRY OF PHYSICAL PLANNING AND CONSTRUCTION

THE STUDY ON INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

FINAL REPORT

VOLUME V
SUPPORTING REPORTS

PROPOSED ENGINEERING AND PROJECT EVALUATION

MAY 1999

NIPPON KOEI CO., LTD.
KRI INTERNATIONAL CORPORATION

JAPAN INTERNATIONAL COOPERATION AGENCY

THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA
MINISTRY OF DEVELOPMENT

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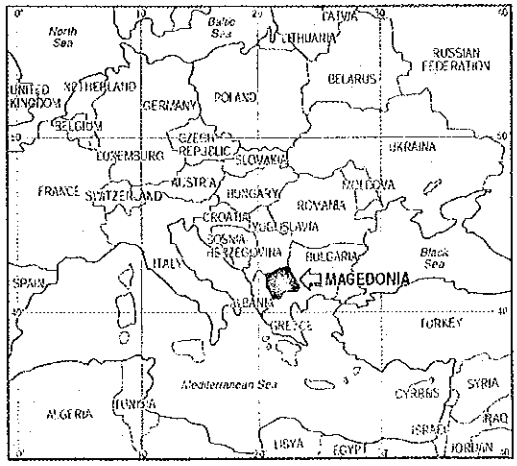
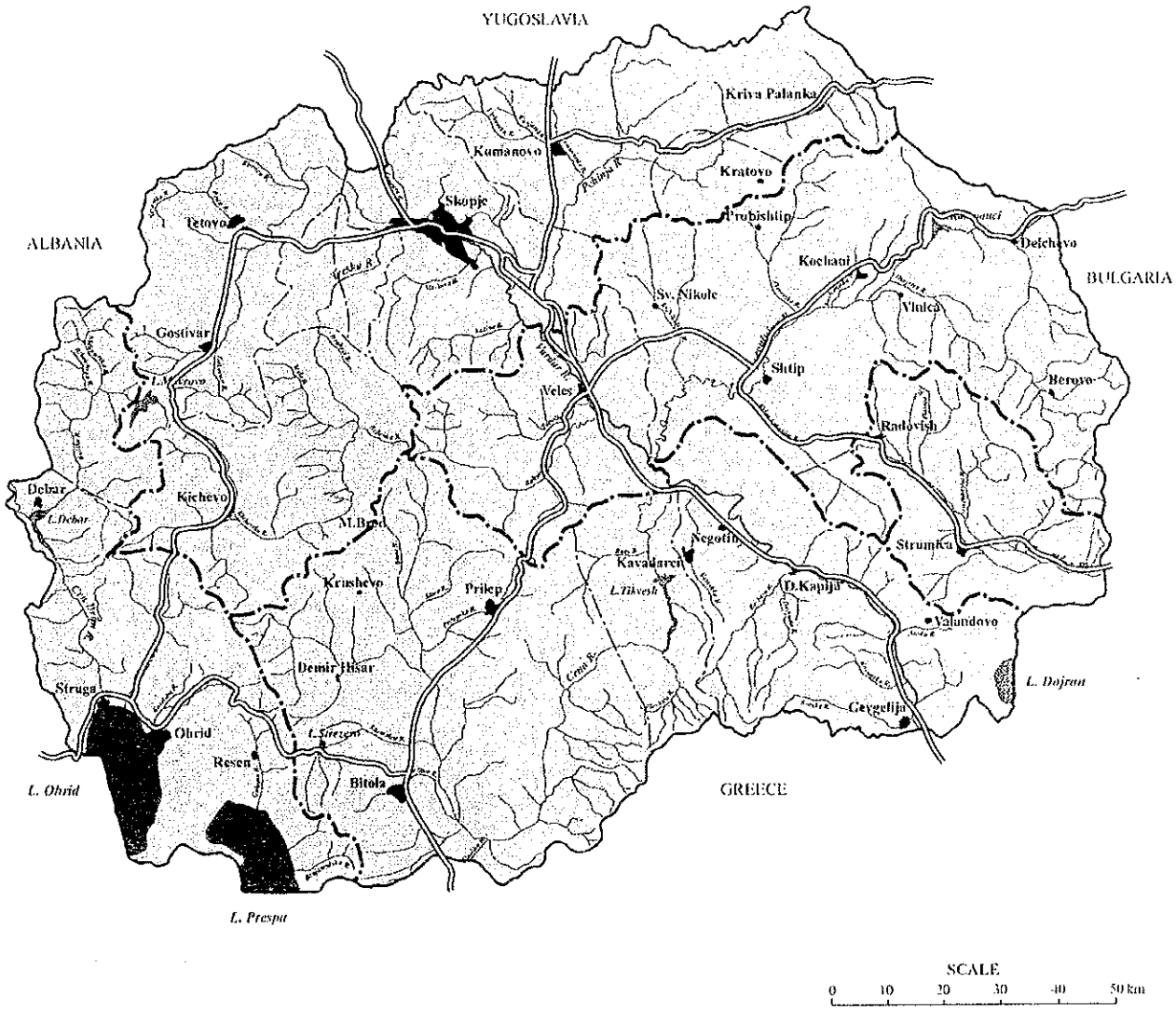
COMPOSITION OF FINAL REPORT

EXCHANGE RATES

The exchange rates used in this Study are:
US Dollar (US$)1.00 = Macedonian Denar (MKD) 52.00
Deutsche Mark (DM) 1.00 = Macedonian Denar (MKD) 30.98
as of Jan.1999



KEY MAP



Location Map

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ABBREVIATIONS AND ACRONYMS

ACU	-	Aid Coordination Unit
a.s.l	-	above sea level
BOD	-	Biological Oxygen Demand
CE(s)	-	Communal Enterprise(s)
DO	-	Dissolved Oxygen
EBRD	-	European Bank for Reconstruction and Development
ECM	-	Electric Power Company of Macedonia
EC	-	European Community
EL	-	Elevation
EU	-	European Union
FRY	-	Federal Republic of Yugoslavia
FYROM	-	The Former Yugoslav Republic of Macedonia
GDP	-	Gross Domestic Product
GEF	-	Global Environment Facility
GNP	-	Gross National Product
GOJ	-	Government of Japan
GOM	-	Government of Macedonia
GTZ	-	Deutsche Gesellschaft für Technische Zusammenarbeit
HMI	-	Republic Hydrometeorological Institute
I/R	-	Interim Report
IEE	-	Initial Environmental Examination
IBRD	-	International Bank for Reconstruction and Development
IDA	-	International Development Association
IMR	-	Infant Mortality Rate
JICA	-	Japan International Cooperation Agency
JUS	-	Jugoslavian Standards
MAFWE	-	Ministry of Agriculture, Forestry and Water Economy
MCIC	-	Macedonian Center for International Cooperation
MKS	-	Macedonian Standards
MOD	-	Ministry of Development
MOE	-	Ministry of Economy
MOH	-	Ministry of Health
MUPC	-	Ministry of Urban Planning and Construction
MOEn	-	Ministry of Environment
MOS	-	Ministry of Science
MOFA	-	Ministry of Foreign Affaires
NDS	-	National Development Strategy 1997
NEAP	-	National Environmental Action Plan 1997
NEHAP	-	National Environmental Health Action Plan
NGO(s)	-	Non Governmental Organization(s)

ABBREVIATIONS AND ACRONYMS (Continued)

ODA	-	Official Development Assistance
O&M	-	Operation and Maintenance
PCM	-	Project Cycle Management
PDM	-	Project Design Matrix
PHARE	-	Pologne et Hongri Aide a Reconstruction Economique (Poland and Hungary Aid for Economic Reconstruction)
PIP	-	Program for Public Sector Investment in the Republic of Macedonia 1998-2000
P/R	-	Progress Report
PWME	-	Public Water Management Enterprise
RIHP	-	Republic Institute for Health Protection
S/W	-	Scope of Work
SS	-	Suspended Substances
SFRY	-	Socialist Federal Republic Yugoslavia
UNDP	-	United Nations Development Program
UNESCO	-	United Nations Educational, Scientific and Cultural Organization
UNICEF	-	United Nations Children's Fund
WHO	-	World Health Organization
WDI	-	Water Development Institute
WMO(s)	-	Water Management Organization(s)
WUA(s)	-	Water Users' Association(s)

WEIGHTS AND MEASURES

Metric System

mm	-	Millimeter(s)	ha	-	Hectare (100m x 100m)
m	-	Meter(s)	l	-	Liter(s)
m^2	-	Square meter(s)	lit/sec (l/sec)	-	Liter per second
km^2	-	Square kilometer(s)	m^3	-	Cubic meter(s)
lpcd	-	litre/capita/day	m^3/sec (m^3/s)	-	Cubic meter(s) per second
			p.e.	-	population equivalent

CURRENCY

MKD	-	Macedonian Denar	DM	-	Deutsche Mark
USD	-	United States Dollar	JPY	-	Japanese Yen

Appendix L

Outline of Project Evaluation

Appendix L OUTLINE OF PROJECT EVALUATION

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Appendix L OUTLINE OF PROJECT EVALUATION

L.1 General

Based on the water balance calculation and needs of water resources development and water quality conservation in each river basin, development projects were initially studied on their background and feature as proposed ones. As for gathering information on water resources development projects identified in the past, the following study documents and national development plan prepared by the Government were reviewed at initial stages of the Study:

1) Integrated Development of the Vardar/Axios River Basin Master Plan
2) Program for Public Sector Investment in the Republic of Macedonia (1998 – 2000)

Apart from the development projects once scrutinized by the above, 44 development projects were identified and selected, and the project evaluation was carried out for getting one of bases for formulation of the Water Resources Development Plan in the Master Plan especially in the aspect of appropriate location of dam sites considering the present condition of inhabitants surrounding the sites, relevant information from the local governments and outcome of the PCM Workshops as well. The selected projects are tabulated in Table L.1 by region, which are grouped into two; one is a group of development projects except for rural water supply projects, and the other is a group of rural water supply projects.

The first group includes 33 projects targeting supply for mainly municipal water, industrial water and agricultural water, and further water supply for hydropower generation to be developed newly as well as water for environmental conservation.

The second group includes 11 rural water supply projects, which were separately investigated and studied from the municipal and industrial water supply and irrigation development projects by the Communal Enterprises(ECs) and Water Management Organizations (presently PWMEs). It is because that development goal and direction, and parameters for improvement of social environment are different each other. In other words, development projects by the CEs are concerned with the improvement of the water services to meet demand on water of the inhabitants. On the other hand, rural water supply projects are more deeply connected with satisfaction of the Basic Human Needs (BHN), such as decrease of infant death rate and acute communicable diseases, etc.

44 projects as selected were evaluated firstly from 6 aspects with tentative prioritization (called as "First/tentative prioritization" hereinafter), then the

results were reviewed from viewpoints of consistency with outputs in the PCM workshops, results of the Initial Environmental Examination(IEE; if Environmental Impact Study or EIS will be required for the next step or not), objectives of the Water Quality Conservation Plan – one of the Water Resources Management Plan – so as to harmonize the projects with environment, and so on (called as "Final prioritization").

The rural water supply projects were evaluated separated from the other projects.

Prior to the project evaluation, estimate of cost and economic benefit/financial revenue was carried out for the next steps.

L.2 Profile and Drawings for Development Projects

Profiles of development projects are compiled in Annex 16 together with drawings, principal features of potential dams, principal features of existing and under construction dams, and project description in the 5 river basins (or region).

The work quantities of development projects were estimated approximately based on the drawings and referring to the profile. Such quantities were used for cost estimate as described in Appendix M. The drawings were prepared based on topographic maps if any available and following to the project dimensions on the Master Plan levels. From these circumstances, there are some differences in an accuracy among quantities of each project, which shall be taken into consideration in the evaluation.

L.3 Preconditions for Development Projects

L.3.1 Preconditions for Municipal and Industrial Water Supply Projects

The water supply projects by ECs, which supply municipal water and industrial water for the urban area and a part of rural area, require development of new water sources as well as water supply system to each households and factories. Improvement projects for the existing facilities were not planned in the Master Plan, of which importance was called for an attention because of data availability and huge/complicated works which need some more time and be carried out separated from formulation of the Master Plan.

L.3.2 Preconditions of Agricultural Water Supply Projects

The water supply projects by PWMEs and/or ECs, which supply agricultural water for the irrigation system, require development of new water sources as well as water supply system to each irrigation area. Improvement projects for the existing facilities were partly included in this Master Plan, because of its cost performance with rather small works for the planning comparing with that for municipal and industrial water supply project on the Master Plan level.

L.3.3 Preconditions of Water Supply Projects for Power Generation and Environmental Conservation

The projects relating to the power generation are just additional and assumed to use surplus water from the above three water use purpose. The project relation to environmental conservation is assumed to supply/discharge water to the polluted river with quantity not less than the biological minimum, which was set at 10 % of the average discharge of the river together with supply of municipal water.

L.3.4 Preconditions on Village Water Supply System

Although the statistical values contain uncertain data, especially village population, as detailed in Annex 17, the coverage rates in 1991 and 1997 can be estimated as follows;

- The coverage rates in rural areas are 20 % contributed by CEs and 55 % by VSs.
- The total population not yet supplied by CEs and VSs is approximately 200,000.
- The total number of villages not yet supplied by CEs and VSs is approximately 700. (VSs : Village Supply(ies))
- Coverage percentage by CEs will be not changed in future, i.e. 20 % up to the final target year 2025.
- Coverage percentage by VSs is 55 % in 1996 and will be increased to 80 % up to the final target year 2025.
- The average daily water consumption in Macedonia is currently about 150 liter/capita. The net domestic water consumption is assumed to be 250 liter/capita and day, which is equivalent to a gross figure after adding communal demands and system losses.
- Details of preconditions on the village water supply system are referred to Annex 17.

L.4 Component of Structures

In the Study, preliminary facility planning and dimensioning structures were conducted to estimate investment cost and operation/maintenance cost of the projects. For that purpose, the following basic configuration was assumed by each type of project, such as municipal/industrial water supply, irrigation water supply and water supply for hydropower projects.

L.4.1 Municipal and Industrial Water Supply Systems

Municipal and industrial water supply systems contemplated in the development projects are divided into the three kinds of structures as follows:

1) Water source intake structures

2) Water conveying structures

3) Water purifying structures

Taking account of the existing dominant systems in Macedonia for municipal and industrial water supply facilities, the following structures for above three components, which is consisting of the whole system, were considered.

1) Dam and river intake (or wells)

2) Main pipeline (steel or PVC pipe), service reservoir and pumping station

3) Filter station

L.4.2 Irrigation Water Supply Systems

The structures for irrigation water supply systems were assumed to be common configuration as same as the existing irrigation systems in Macedonia, such as dam, river intake, main canal, diversion structures, secondary/tertiary canals, pumping facilities and distribution pipe network etc. Regarding the cost estimate of the systems for economic/financial evaluation is described in Appendix M.

L.4.3 Hydropower Generating Facilities

Hydropower development is considered to gain the incremental benefit by implementation of multipurpose projects in the river basin. The scale of power plants attached to the dam project varies from 5,000 to 15,000 kW in terms of installed capacity for total 3 proposed projects. The components of the required structures are intake structure (normally incorporated in dam and reservoir), valve chamber, headrace, surge chamber, penstock, power station and swictchyard etc.

L.4.4 Village Water Supply Systems

The following four (4) types of village water supply systems were designed according to available water sources;

1) Spring intake system

2) Well/borehole system

3) River intake (Tyrolean intake) system

4) Mixed system

Details of the above system are shown in Annex 17 including standard drawings of domestic well, spring intakes and Tyrolean intakes.

Table L.1 Projects Identified/Selected for Project Evaluation

River Basin	No.	Code	Project Name	Purpose
(except Rural Water Supply Projects)				
1. Vardar River Upper Reach	1	A1-1	Water Supply Project for Tetovo - River Pena Intake	M&I
	2	A1-2	Studena Voda Groundwater Development Project	M
	3	A1-3	Kichevsko Pole Area Irrigation Rehabilitation Project	RI
	4	A1-4	Construction of By-pass Channel Raven - Rechica	A
	5	A1-5	Patishka Reka Water Supply Project	M
	6	A1-6	Paligrad Multipurpose Dam Project	M&I,A,P
	7	A1-7	Slupchanka Dam Project	M
	8	A1-8	Lipkovo - Glaznja Area Irrigation Rehabilitation Project	RI
	9	A1-9	Kiselichka Dam Project	M&I,A
	10	A1-10	Vakuf Multipurpose Dam Project	M&I,A,P
	11	A1-11	Pelince Dam Project	A
2. Vardar River Middle Reach	12	A2-1	Razlovci Dam Project	M&I,A
	13	A2-2	Blatec Dam Project	M&I,A
	14	A2-3	Rechani Multipurpose Dam Project	M&I,A,P
	15	A2-4	Zletovica Multipurpose Dam Project	M&I,A,P
	16	A2-5	Construction of Irrigation of Sub-system "Shtipskpo - Pole",left side	A
3. Vardar River Lower Reach	17	A3-1	Krapa Dam Project	M&I,A
	18	A3-2	Zhvan Dam Project	A
	19	A3-3	Obednik Dam Project	A
	20	A3-4	Kochiste Dam Project	A
	21	A3-5	Zhurche Dam Project	A
	22	A3-6	Konjarka Dam Project	A
	23	A3-7	Studencica Supplemental Water Supply Project	M&I
	24	A3-8	Petrushka Dam Project	A
	25	A3-9	Kovanska Dam Project	A
	26	A3-10	Konsko Dam Project	M&I,A
	27	A3-11	Valandovo Area Irrigation Rehabilitation Project	RI
4. Crn Drim	28	A4-1	Irrigation System Betterment Project in Resen	RI
	29	A4-2	Ohrid Area Irrigation Rehabilitation Project	RI
5. Strumica	30	A5-1	Podares Dam Project	M&I,A
	31	A5-2	Oraovica Dam Project	M&E
	32	A5-3	Mantovo Area Irrigation Rehabilitation Project	RI
	33	A5-4	Strumica Area Irrigation Rehabilitation Project	RI
(Rural Water Supply Project)				
1. Vardar River Upper Reach	34	B1-1	Vardar River Upper Reach Rural Water Supply Project	RS
	35	B1-2	Treska River Upper Reach Rural Water Supply Project	RS
	36	B1-3	Regional Water Supply "Petrovec"	RS
	37	B1-4	Skopje Circle Rural Water Supply Project	RS
	38	B1-5	Kriva Palanka/Kumanovo Circle Rural Water Supply Project	RS
2. Vardar River Middle Reach	39	B2-1	Bregalnica River Basin Rural Water Supply Project	RS
3. Vardar River Lower Reach	40	B3-1	Pelagonia Circle Rural Water Supply Project	RS
	41	B3-2	Regional Water Supply "Medzitlija"	RS
3/5. Vardar River Lower Reach/Strumica	42	B3-3	Vardar River Lower Reach/Strumica River Basin	RS
4. Crn Drim	43	B4-1	Southwest Mountainous Area Rural Water Supply Project	RS
-whole country-	44	B6-1	Nationwide Rural Water Supply Extension/Improvement Project	RS

Remarks : M : Municiapl, I : Industrial, A : Agricultural, P : Power, E : Environmental,
RI : Irrigation Rehabilitation, RS : Rural Water Supply

Appendix M

Estimate of Cost, Economic Benefit and Financial Revenue

Appendix M ESTIMATE OF COST, ECONOMIC BENEFIT AND FINANCIAL REVENUE

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Appendix M ESTIMATE OF COST, ECONOMIC BENEFIT AND FINANCIAL REVENUE

M.1 General

Cost, economic benefit and financial revenue were estimated prior to the project evaluation, because they play among other important parts for Economical Internal Rate of Return (EIRR) as well as Financial Rate of Return (FIRR), which are estimated based on the economic benefit (B) and economic cost (C) for economical viability and the financial revenue (R) and financial expenditure (E) for financial viability, respectively.

M.2 Estimate of Cost

Cost estimate was carried out multiplying work quantities of major items to unit cost drawn from similar projects.

M.2.1 Estimate of Construction Cost

(1) Cost Estimate for Development Projects except for Rural Water Supply

Construction costs were estimated based on quantity of major items as follows;

1) Fill type dam,
2) Tyrolean intake,
3) Main pipeline,
4) Filter station,
5) Service reservoir,
6) Pumping station

Data referred to for these structures are compiled in Annex 18, together with (i) tariff of electricity, (ii) labour cost, and (iii) Inflation rate (These 3 figures are used in the Project Evaluation in Chapter 9).

(2) Costs Estimate of Rural Water Supply Projects

The construction costs of spring intakes, wells/boreholes, pipelines, reservoirs and filter stations are estimated based on reviews of the technical reports of village water supply systems, which were reported to MUPC to obtain the governmental subsidies.

1) Spring intake

The costs of spring intakes are estimated as follows;

Population	Demand (l/sec)	Cost (10^3MKD)
450	1.3	600
1320	3.8	1,000

2) Well/borehole and well-pump station

The cost of well construction is estimated at 20,000 US$, in the case that the designed well depth with a bottom cap of 1 m for sedimentation is 50 cm, the designed pumping head is 30 m and that the designed diameter of the well is 250 mm.

The construction cost of a well-pump station is estimated at 28,000 US$, in the case that the well-pump station is designed in a cabin with dimensions of 2 x 2 x 2 m, and that electromechanical equipment (400 V and 50,000 W) is installed.

The costs of an electrical submersible pumps are estimated at 3,400 to 5,100 US$, in the case that the pumping heads are 25 to 50 m and the pump capacity is 10 l/sec. The electrical pumps require regular maintenance to be done by a mechanic.

3) Pipeline (PVC: Polyvinyl Chloride)

PVC (polyvinyl chloride) pipe is generally adopted in village water supply systems.

- Main pipeline (225 or 125 mm in diameter, 10 or 6-bar waterproof) :5 km
- Secondary pipeline (75 mm in diameter, 6-bar waterproof) :3 km

It is understood that terminal facilities including faucets and pipes in the houses from the secondary network pipelines can be set up by consumers or village people.

The cost of the PVC pipeline network with a diameter of 225 mm is estimated at 13.9×10^6 MKD, in the case that main pipelines are designed to be 5 km in length, and that secondary pipelines are designed to be 3 km. The cost of the PVC pipeline network with a diameter of 125 mm is estimated at 2.5×10^6 MKD, in the case that main pipelines are designed to be 1 km in length, and that secondary pipelines are designed to be 1.5 km. The unit prices of pipelines per meter for each diameter are estimated as follows:

Diameter of pipes (mm)	10^3 MKD/m
75	0.8
125	1.3
225	2.3

4) Reservoir

The capacities of reservoirs are designed to be 20 % of daily maximum water supply volume, which is generally adopted in village water supply systems in Macedonia, to adjust daily unevenness of water demand.

Population of water supply	Capacity (m^3)	10^6 MKD
450	50	1.4
1320	130	2.6
5820	350	4.0

5) Filter station

There is no need to construct a filter station in village water supply system in the case that spring water can be utilized as a water source. In the cases of a well/borehole and a river intake as a water source, however, a filter station should be designed to remove iron and manganese and chlorination facility should be necessary for disinfection.

Population of water supply	Capacity (m^3/hr)	10^6 MKD
450	10	1.65
1320	20	2.0
5820	40	2.5

(3) Cost Estimate for Water Resources Management Plan

Approximate cost for implementation of the Water Resources Management Plan that is recommended in the Master Plan was estimated preliminarily considering the project scale, amount of instruments and required engineering services for planning/design, etc as shown in Table M.1.

M.2.2 Estimate of Economic Cost

The economic cost was estimated by multiplying the shadow factor (= 0.9) to the direct construction costs obtained as above.

M.3 Estimate of Economic Benefit

(1) Economic benefit for municipality and industrial water supply was estimated based on water tariff.

The market price of water charge is estimated at 18 MKD/m^3 for a financial analysis and an economic shadow price of water charge is also estimated at 16.2 MKD/m^3.

(2) Economic benefit for agricultural water supply was excluded.

The price of water charge is not accounted in economic analysis, because it is not expected as economic benefit. The details are shown in Annex 19.

(3) Economic benefit for power generation water supply was estimated based on water tariff as shown in Annex 18.

(4) Economic benefit for rural water supply was estimated as follows.

a) Water charge for economic analysis

According to the results of "Water Utilization Survey" by the JICA Study, the willingness to pay for water consumption is 1.5 to 2 times as high as the present average water charge (12 MKD/m^3). Therefore, a market price of water charge is estimated at 18 MKD/m^3 for a financial analysis and an economic shadow price of water charge is also estimated at 16.2 MKD/m^3.

b) Reduction in water-borne diseases

The benefits to the sufferers of water-borne diseases are the estimated reduction in water-borne diseases and the estimated increase in working chance. The benefits from the viewpoint of economic analysis are estimated and calculated as follows,

- Average sufferers of water-borne diseases: 0.15 % of total population
- Average daily earnings: 500 MKD/person
- An average annual business suspension: 7 days/year

c) Direct income compensation to farmers and foresters

The farmers and foresters, who are working for food and forest production in mountainous and isolated areas, play a great part for environmental protection and conservation of forests and natural landscapes. From the viewpoint of public economy, the farmers and foresters should be compensated for their uncountable contribution to environmental protection and green tourism which urban dwellers will spend in mountainous and agricultural areas. The idea of this compensation to the farmers and foresters has been widely spread in European countries and the policy of the compensation finance or direct income compensation (negative income tax) finance, was accepted by EC countries in 1975.

The benefits of direct income compensation from the viewpoint of economic analysis are estimated and calculated as follows,

- An average family size: 5 persons
- An average amount of direct income compensation: 200 MKD/month/person
  (This amount is equivalent to approximately 10% of an average monthly income of one farmer's family.)

These are based on the village water supply inventory as shown in Annex 20.

Results of estimate of economic benefits are shown in Annex 11 for "Financial and Economic Analysis of Projects " for development projects

except ,for rural water supply projects, and in Annex 12 for those of the rural water supply projects.

M.4 Estimate of Financial Benefit

(1) Financial revenue for municipality and industrial water supply was estimated based on water tariff.

The market price of water charge estimated at 18 MKD/m^3 is adopted as the unit financial revenue for financial analysis.

(2) Financial revenue for agricultural water supply was estimated based on water tariff.

The market price of water charge varied by kinds of crops, which are ranging from 4,000 MKD (wheat) to 24,000 MKD (peppers) per hectare, is adopted as the unit financial revenue for financial analysis. The details are shown in Annex 19.

(3) Financial revenue for power generation water supply was estimated based on water tariff as shown in Annex 18.

(4) Financial revenue for rural water supply was estimated same as that for municipal and industrial water supply.

Results of estimate of financial benefits are shown in Annex 11 for "Financial and Economic Analysis of Projects " for development projects except for rural water supply projects, and in Annex 12 for those of the rural water supply projects.

Table M.1 Preliminary Cost Estimate of Water Resources Management Plan

Unit:US$ mil.

Plan	Quantity	Unit cost	Amount
1 Water Quality Conservation Plan	-	-	217.00
2 Watershed Conservation Plan	19 projects	10.0	190.00
3 Surface Water and Groundwater Monitoring System Improvement Plan			
(a) Water Level Monitoring Network Improvement and Expansion Plan			
・Limunigraph (including installation cost)	12nos.	0.025	0.30
・Preparation of data bank system	-	L.S.	1.00
・Development of software	-	L.S.	0.50
・Engineering services (for planning/design)	30M/M	0.02	0.60
Subtotal			2.40
(b) Flood Forecasting and Warning System Enhancement Plan			
・Telemetering gauging stations	28nos.	0.025	0.70
・Transmission and telecomunication facilities	-	L.S.	5.00
・Development of software	-	L.S.	0.50
・Engineering services (for planning/design)	100M/M	0.02	2.00
Subtotal			8.20
(c) Surface Water Quality Monitoring Network Enhancement Plsn			
・Water quality monitoring instruments	10sets	0.02	0.20
・Engineering services (for planning/design)	30M/M	0.02	0.60
Subtotal			0.80
(d) Groundwater Monitoring Network Enhancement Plan		L.S.	50.00
Total			61.40
4 Water-related Facilities Operation and Maintenance Improvement Plan			
(a) Operation and Maintenance Manual of Water Supply Facilities	20M/M	0.02	0.40
(b) Operation and Maintenance Manual of Dam and Appurtenant Structures	30M/M	0.02	0.60
(c) Operation and Maintenance Manual for Irrigation Facilities	30M/M	0.02	0.60
Total			1.60
Grand total			470.00

Remarks: M/M, mon-month

Appendix N

Project Evaluation

Appendix N PROJECT EVALUATION

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Appendix N PROJECT EVALUATION

N.1 Guideline of Evaluation

The selected projects were firstly evaluated from the six following aspects :

(1) Economic aspect

(2) Financial aspect

(3) Technical aspect

(4) Social Aspect

(5) Institutional aspects, as well as

(6) project priority previously given by the Macedonian side through the Program for Public Sector Investment in the Republic of Macedonia 1998 – 2000 (PIP).

Then with the above results, the comprehensive evaluation was conducted to understand the general trend and to detect abnormal factors through a rough rating of the project based on the results of the six aspects evaluation. The selected projects were tentatively prioritized (called as "First/tentative prioritization" hereinafter) following the results of the comprehensive evaluation.

The rural water supply projects, to be developed in a mountainous and/or border area far from the urban area, were evaluated separated from the other projects, considering their service in the interest of the public to meet needs in the communities and relatively low-level performance of the economical and financial evaluation. Further, BHN was given the top priority in the social aspect, which is the main criteria in the evaluation.

44 projects as evaluated through the "First/tentative prioritization" hereinafter), were further reviewed from viewpoints of consistency with outputs in the PCM workshops, results of the Initial Environmental Examination (IEE; if Environmental Impact Study or EIS will be required for the next step or not), objectives of the Water Quality Conservation Plan – one of the Water Resources Management Plan – so as to harmonize the projects with environment, and so on (called as "Final prioritization").

The evaluation criteria is tabulated below;

Evaluation Criteria

1. First/tentative prioritization

No.	Aspect	Criteria	Ranking
(1)	Economical	EIRR more than 15% (8%)	A
		EIRR 8 – 15% (4 - 8%)	B
		EIRR less than 8 % (4%)	C
(2)	Financial	FIRR more than 15% (8%)	A
		FIRR 8 – 15% (4 - 8%)	B
		FIRR less than 8 % (4%)	C
(3)	Technical	Difficulty of technique adopted in construction -judged through common sense internationally recognized	A/B/C
(4)	Social	1) Social contribution/satisfying development need (except for Rural Water Supply Project)	A/B/C
		2) Satisfying Basic Human Need (BHN) (for Rural Water Supply Project)	A/B/C
(5)	Organizational	Current organization/reinforcement/new organization/combination of organization	A/B/C
(6)	Priority in Macedonia	1) Listed up in PIP	A/B/C

Note: Figures of EIRR and FIRR in parentheses are those for rural Water Supply Projects

2. Final prioritization

No.	Viewpoints	Criteria	Ranking
(1)	First Evaluation	1) Results of 1.	
(2)	Output in PCM Workshop	2) Consistency with output from PCM Workshop	—
(3)	IEE	3) Necessity of EIS in the next steps	—
(4)	Water Quality Conservation Plan	4) Harmony with environment	—
(5)	Others	5) Donors' activity, and so on	—

In preparation of the table, criteria adopted by other donor's such as the World Bank were referred to.

N.2 First/tentative Prioritization

N.2.1 Economical Evaluation

The economical viability was checked with EIRR calculated based on the economic cost and benefit as obtained in Appendix M. The results are shown in Annex 11 for development projects except for rural water supply project, and in Annex 12 for development projects for rural water supply project.

N.2.2 Financial Evaluation

The financial viability was checked with FIRR calculated based on the economic cost and benefit as obtained in Appendix M. The results are shown in Annex 11 for development projects except for rural water supply project, and in Annex 12 for development projects for rural water supply project.

N.2.3 Technical Evaluation

Technical evaluation was made based on the difficulty of techniques adopted in construction, which was judged through common sense internationally recognized, and so on. The results are shown in Annex 13.

N.2.4 Social Evaluation

Social evaluation was made based on social contribution/satisfying development need except for rural water supply project, and so on. Satisfying Basic Human Need (BHN) was given the top priority in the evaluation of rural water supply project. The results are shown in Annex 14.

N.2.5 Institutional Evaluation

Institutional evaluation was made based on if the project can be managed by the current organization or not, and so on. The results are shown in Annex 15.

N.2.6 Government Priority in PIP

Development projects were checked whether it they are listed up in the PIP or not. Among the 44 development projects, the following projects are listed up in PIP (1998 – 2000);

1) A part of the Rechani Multipurpose Dam Project (A2-3 : code in the Master Plan)
2) Studencica Supplemental Water Supply Project (A3-7 : - do -)

These projects (1 to 2) are provided with the foreseen financing

3) Patishka Reka Water Supply Project (A1-5)
4) Zletovica multipurpose dam project (A2-4: - do -)
5) Konsko Dam Project (A3-10: - do -)
6) Construction of By-pass Channel Raven – Rechica (A1-4: - do -)
7) Construction of Irrigation Sub-system Shtipsko Pole, left side (A2-5)

These projects (3 to 7) have not been provided with the financing yet.

N.2.7 Results of First Prioritization

44 projects were comprehensively evaluated and classified into in three ranks of A (high : 13 projects), B(medium : 19 projects) and C (low : 12 projects) as shown in Table N.1, then they were put into the final prioritization.

N.3 Final Prioritization

Final prioritization was carried out from view points of (i) consistency with output from PCM workshop, (ii) Necessity of EIS (Environmental Impact Study) based on results of IEE (Initial Environmental Examination), (iii) Harmony with environment so as to conform the Water Quality Conservation Plan, one of the Water Resources Management Plan, and so on. Further, Village Water Supply Program 1998-2000 by MCIC (Macedonian Center for International Cooperation), as sown in Annex 21, are also referred to for final prioritization of the rural water supply project.

As the results of the final prioritization as shown in Table N.1, the following projects are ranked as "A" with high priority and will be proposed to be implemented in the PHASE I (1999 – 2005).

Development Projects Ranked "A" and Proposed in PHASE I (1999 – 2005)

River Basin	Project Name (No.)	Purpose
1. Vardar River Upper Reach	1) Water Supply Project for Tetovo – River Pena Intake(1)	M&I
	2) Kichevsko Pole Area Irrigation Rehabilitation Project(2)	RI
	3) Patishka Reka Water Suply Project (3)	M
	4) Slupchanka Dam Project (4)	M
	5) Treska River Upper Reach Rural Water Supply Project(34)	RS
	6) Skopje Circle Rural Water Supply Project(35)	RS
	7) Kriva Palanka/Kumanovo Circle Rural Water Supply Project(36)	RS
2. Vardar River Middle Reach	1) Zletovica Multipurpose Dam Project	M&I
3. Vardar River Lower Reach	1) Valandovo Area Irrigation Rehabilitation Project (6)	RI
	2) Pelagonia Circle Rural Area Water Supply Project (37)	RS
4. Crn DrimRiver	1) Irrigation System Bettrement Project in Resen (30)	RI
5. Strumica River	1) Oraovica Dam Project (34)	M&E

(M:Municipal water, I:Industrial water, RI:Irrigation rehabilitation, RS: Rural water supply , P: Water supply for power generation, E: Water supply for environmental conservation)

Among 44 projects, the Oraovica Dam Project ranked as "B" in the first prioritization was advanced to rank "A" because of its contribution to environmental conservation in the Strumica river, which is polluted as severe as BOD more than 20, while 2 rural water supply projects – regional water supply "Petrovec" and that "Medztlija" were incorporated into the Skopje Circle Rural Water Supply Project and Pelegonia Circle Rural water Supply Project respectively, considering their almost same ranking, adjacent situation and small size of the former comparing with the latter one (ref. Table N.2).

Table N.1 Result of Project Evaluation (1/2)

Municipal, industrial, agricultural water and hydropower development project

River Name	No.	Code No.	Project Name	Purpose	Initial Evaluation							Second Evaluation		
					Economic	Financial	Technical	Institutional	Social	Priority in Macedonia#	Overall	PCM	Environmental (IEE)	Final
Vardar River Upper Reach	1	A1-1	Water Supply Project for Tetovo - River Pena Intake	M & I	A	A	B	B	A	C	A	–	–	A
	2	A1-2	Studena Voda Groundwaer Developmenrt Project	M	B	B	A	B	A	C	B	–	–	B
	3	A1-3	Kichevsko Pole Area Irrigation Rehabilitation Project	RI	A	A	B	B	B	C	A	–	–	A
	4	A1-4	Construction of By-pass Channel Raven Rechica	A	C	C	C	B	C	B	C	–	–	C
	5	A1-5	Patishka Reka Water Supply Project	M	A	B	A	B	A	B	A	A	–	A
	6	A1-6	Paligrad Multipurpose Dam Project	M & I,A,P	B	C	A	B	A	C	B	C	–	B
	7	A1-7	Slupchanka Dam Project	M	A	B	A	A	A	C	A	A	–	A
	8	A1-8	Lipkovo - Glaznja Area Irrigation Rehabilitation Project	RI	B	B	B	B	B	C	B	A	–	B
	9	A1-9	Kiselichka Dam Project	M & A	B	B	B	B	A	C	B	A	EIS	B
	10	A1-10	Vakuf Maltipurpose Dam Project	M & I, A,P	B	B	B	C	A	C	B	A	EIS	B
	11	A1-11	Pelince Dam Project	A	C	C	C	B	B	C	C	–	–	C
Vardar River Middle Reach	12	A2-1	Razlovci Dam Project	M & I, A	B	B	B	B	A	C	B	–	–	B
	13	A2-2	Blartec Dam Project	M & I, A	C	C	B	B	B	C	C	A	EIS	C
	14	A2-3	Rechani Multipurpose Dam Project	M & I, P	C	C	B	C	A	A	B	A	–	B
	15	A2-4	Zletovica Multipurpose Dam Project (Phase I)	M & I	B	B	A	A	A	B	A	A	–	A
	16	A2-5	Construction of Irrigation Sub-system Shtipsko Pole, left side	A	A	B	B	B	B	B	B	–	–	B
Vardar River Lower Reach	17	A3-1	Krapa Dam Project	M & I, A	C	C	C	B	B	C	C	B	EIS	C
	18	A3-3	Zhvan Dam Project	A	B	B	C	C	C	C	C	A	EIS	C
	19	A3-4	Obednik Dam Project	A	C	C	C	C	C	C	C	A	EIS	C
	20	A3-5	Kochishte Dam project	A	C	C	C	C	C	C	C	A	EIS	C
	21	A3-6	Zhurche Dam Project	A	C	C	C	C	C	C	C	A	EIS	C
	22	A3-7	Konjarka Dam Project	A	B	C	C	B	C	C	C	A	EIS	C
	23	A3-8	Studencica Supplemental Water Supply Project	M & I	C	C	B	B	B	A	B	A	–	B
	24	A3-9	Petrushka Dam Project	A	B	C	C	B	C	C	C	A	EIS	C
	25	A3-10	Kovanska Dam Project	A	C	C	B	B	B	C	B	A	EIS	B
	26	A3-11	Konsko Dam Project	M & I, A	B	C	B	B	A	B	B	A	EIS	B
	27	A3-12	Valandovo Area Irrigation Rehablitaion Project	RI	A	A	B	B	B	C	A	B	–	A
Crn Drim River Basin	28	A4-1	Irrigation System Betterment Project in Resen	RI	A	A	A	B	B	C	A	–	–	A
	29	A4-2	Ohrid Area Irrigation Rehabilitation Project	RI	B	B	B	B	B	C	B	–	–	B
Strumica River Basin	30	A5-1	Podares Dam Project	M & I,	C	C	B	B	B	C	C	A	EIS	C
	31	A5-2	Oraovica Dam Project*)	M & E	B	B	A	B	A	C	B	–	–	A
	32	A5-3	Mantovo Area Irrigation Rehabilitation Project	RI	B	B	B	B	B	C	B	A	–	B
	33	A5-4	Strumica Area Irrigation Rehabilitation Project	RI	B	B	B	B	A	C	B	A	–	B

*): Aming at abatement of pollution in the international river that is deteriorating water quality and at harmonizing with river environment, the Rank B was raised to Rank A .

#, Relation with the "Program for Public Sector Investment of Macedonia 1998 - 2000".

EIS: Environmental Impact Survey to be conduced as the result of the Initial Environmental Examination (IEE)

M: Municipal, I: Industrial, A: Agricultural, P: Power, E: Environmental, RI: Irrigatin rehabilitation

Table N.1 Result of Project Evaluation (2/2)

Rural water supply project

River Name	No.	Code No.	Project Name	Purpose	Initial Evaluation							Secondary Evaluation		
					Economic	Financial	Technical	Institutional	Social	Priority in Macedonia	Overall	PCM	Environmental (IEE)	Final
Vardar River Upper Reach	34	B1-1	Vardar River Upper Reach Rural Water Supply Project	RS	A	C	B	C	B	C	B	–	–	B
	35	B1-2	Treska River Upper Reach Rural Water Supply Project	RS	C	C	B	C	A	C	A	A	–	A
	36	B1-4	Petrovec Rural Water Supply Project*1)	RS	A	C	A	C	B	A	A	A	–	A*1)
	37	B1-5	Skopje Circle Rural Water Supply Project	RS	A	C	B	C	A	C	A	A	–	A
	38	B1-6	Kriva Palanka/Kumanovo Circle Rural Water Supply Project	RS	B	C	B	C	A	C	A	A	–	A
Vardar River Middle Reach	39	B2-1	Bregalnica River Basin Rural Water Supply Project	RS	C	C	B	C	A	C	B	A	–	B
Vardar River Lower Reach	40	B3-1	Pelagonija Circle Rural Water Supply Project	RS	C	C	B	C	A	C	A	A	–	A
	41	B3-2	Medzitlija Rural Water Supply Project*2)	RS	C	C	B	C	B	A	A	A	–	A*2)
Vardar River Lower	42	B3-3	Vardar River Lower Reach/Strumica River Basin Rural Water Supply Project	RS	B	C	B	C	B	B	B	A	–	B
Crn Drim River	43	B4-1	Southwest Mountains Area Rural Water Supply Project	RS	C	C	B	C	B	B	B	–	–	B
Nationwide	44	B6-1	Nationwide Rural Water Supply Extension/Improvement Project	RS	A	C	B	C	C	C	C	–	–	C

*1): Considering the size of the project, this is integrated in (B1-5).
(The result of the initial evaluation is "A")

*2): Considering the size of the project, this is integrated in (B3-1).
(The result of the initial evaluation is "B")

Table N.2 Projects in Water Resources Development

Phase	River Basin	No.	Project Name (Code)	Purpose
(except Rural Water Supply Project)				
I	1. Vardar River Upper Reach	1	Water Supply Project for Tetovo - River Pena Intake (A1-1)	M&I
		2	Kichevsko Pole Area Irrigation Rehabilitation Project (A1-3)	RI
		3	Patishka Reka Water Supply Project (A1-5)	M
		4	Slupchanka Dam Project (A1-7)	M
	2. Vardar River Middle Reach	5	Zletovica Multipurpose Dam Project (Phase I) (A2-4)	M&I
	3. Vardar River Lower Reach	6	Valandovo Area Irrigation Rehabilitation Project (A3-11)	RI
	4. Crn Drim	7	Irrigation System Betterment Project in Resen (A4-1)	RI
	5. Strumica	8	Oraovica Dam Project (A5-2)	M&E
II	1. Vardar River Upper Reach	9	Studena Voda Groundwater Development Project (A1-2)	M
		10	Paligrad Multipurpose Dam Project (A1-6)	M&I,A,P
		11	Lipkovo - Glaznja Area Irrigation Rehabilitation Project (A1-8)	RI
		12	Kiselichka Dam Project (A1-9)	M&I,A
		13	Vakuf Multipurpose Dam Project (A1-10)	M&I,A,P
	2. Vardar River Middle Reach	14	Razlovci Dam Project (A2-1)	M&I,A
		15	Rechani Multipurpose Dam Project (A2-3)	M&I, P
		16	Construction of Irrigation of Sub-system "Shtipsko Pole", left side (A2-5)	A
	3. Vardar River Lower Reach	17	Studencica Supplemental Water Supply Project (A3-7)	M&I
		18	Kovanska Dam Project (A3-9)	A
		19	Konsko Dam Project (A3-10)	M&I,A
	4. Crn Drim	20	Ohrid Area Irrigation Rehabilitation Project (A4-2)	RI
	5. Strumica	21	Mantovo Area Irrigation Rehabilitation Project (A5-3)	RI
		22	Strumica Area Irrigation Rehabilitation Project (A5-4)	RI
III	1. Vardar River Upper Reach	23	Construction of By-pass Channel Raven - Rechica (A1-4)	A
		24	Pelince Dam Project (A1-11)	A
	2. Vardar River Middle Reach	25	Blatec Dam Project (A2-2)	M&I,A
	3. Vardar River LowerReach	26	Krapa Dam Project (A3-1)	M&I,A
		27	Zhvan Dam Project (A3-2)	A
		28	Obednik Dam Project (A3-3)	A
		29	Kochiste Dam Project (A3-4)	A
		30	Zhurche Dam Project (A3-5)	A
		31	Konjarka Dam Project (A3-6)	A
		32	Petrushka Dam Project (A3-8)	A
	4. Crn Drim	-	-	-
	5. Strumica	33	Podares Dam Project (A5-1)	M&I,A
(Rural Water Supply Project)				
I	1. Vardar River Upper Reach	34	Treska River Upper Reach Rural Water Supply Project (B1-2)	RS
		35	Skopje Circle Rural Water Supply Project (B1-4)*1)	RS
		36	Kriva Palanka/Kumanovo Circle Rural Water Supply Project (B1-5)	RS
	3. Vardar River Lower Reach	37	Pelagonia Circle Rural Water Supply Project (B3-1)*2)	RS
II	1. Vardar River Upper Reach	38	Vardar River Upper Reach Rural Water Supply Project (B1-1)	RS
	2. Vardar River Middle Reach	39	Bregalnica River Basin Rural Water Supply Project (B2-1)	RS
	3/5. Vardar River Lower Reach/Strumica	40	Vardar River Lower Reach/Strumica River Basin (B3-3)*3)	RS
	4. Crn Drim	41	Southwest Mountainous Area Rural Water Supply Project (B4-1)*4)	RS
III	-whole country-	42	Nationwide Rural Water Supply Extension/Improvement Project (B6-1)	RS

Remark : M : Municipal, I : Industrial, A : Agricultural, P : Power, E : Environmental, RI : Irrigation Rehabilitation
RS : Rural Water Supply

*1) : includes Regional Water Supply "Petrovec" (B1-3)

*2) : includes Regional Water Supply "Medzitlija" (B3-2)

*3) : includes Regional Water Supply "a part of Grvgelija, Bogdanci, Dojran and Valndovo"

*4) : includes Regional Water Supply "Belchista"

Annex 11

Financial and Economic Analysis

(Except for Rural Water Supply Project)

Benefit and Cost Estimate

Sheet No. 1

Name of Project:	Water Supply Project for Tetovo - River Pena Intake							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Tyrolean intake (Q=400lit/s)	1no.							71
(2) Filter station(Q=200lit/s)	1no.							1,160
(3) Pipeline	10.0	km						305
(4) Power supply and control		L.S.						7
(5) Labolatory	1no.							457
Sub-total (Civil work cost)								2,000
1.2 Mechanical work								100
1.3 Electrical work								0
Sub-total (Direct construction cost)								2,100
2. Indirect cost (50% of Direect construction cost)								1,050
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (10% of C/W cost)								210
Financial cost								3,150
Economic cost (90% of financial cost)								2,835

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^{3}m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit					
1 Water charge (CE Tetovo)					
1.1 Domestic water	16.2	2,300		37.3	717
Sub-total					
II. Financial benefit (revenue)					
1 Water charge (CE Tetovo)					
1.1 Domestic water	18.0	2,090		37.6	723
Total					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	2,965 US$10^3	B-C:	2,544 US$10^3
B/C:	1.61	B/C:	1.47
EIRR:	17.0%	FIRR:	15.0%

Sheet No. 2

Name of Project:	Studena Boda Groundwater Development Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of dam	0	10^3m^3						
(2) Construction of irrigation facilities	0	ha						
(3) Construction of water supply facility								
a. Exploration of well (4 nos.)	0	l/sec						
b. Pipeline (D=180 mm, Q=50 l/sec)	24,000	m	5.4	12.6	130	302	22	432
c. Pumping station	1,800	l/sec			180	420	31	600
Sub-total (Civil work cost)					310	722	54	1,032
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)					310	722	54	1,032
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								103
Financial cost								1,032
Economic cost (90% of financial cost)								929

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					0
2 Water supply benefit					
2.1 Domestic water supply (Q=200 lit/s)	16.2	630,720		10,218	196
Sub-total					196
II. Financial benefit (revenue)					
1 Irrigation benefit					0
2 Water supply benefit					
2.1 Domestic water supply (Q=200 lit/s)	18.0	630,720		11,353	218
Sub-total					218
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	213 US$10^3	B-C:	63 US$10^3
B/C:	1.12	B/C:	1.03
EIRR:	10.7%	FIRR:	8.6%

Benefit and Cost Estimate

Sheet No. 3

Name of Project:	Kichevsko Pole Irrigation System Rehabilitation Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	($US10^3$)
I. Direct construction cost								
1.1 Civil work								
1.1.2 Main construction works								
Rehabilitation of irrigation System	1450	ha		2000				2,900
Sub-total (Civil work cost)								2,900
1.2 Mechanical work (5% of C/W)								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2 Annual O/M cost (5% of C/W cost)								290
Financial cost								2,900
Economic cost (90% of financial cost)								2,610

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	($10^3 m^3$/year)		(MKD.mil.)	($US10^3$)
I. Economic benefit (Ref.Appendix)					842
1 Water charge					
1.1					
1.2					
(50 % increase of current tariff)					
Sub-total					
II. Financial benefit					823
1					
1.1					
1.2					
(considering inflation during construction)					
Sub-total					
Note:					
Total					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	3,338 $US10^3$	B-C:	2,571 $US10^3$
B/C:	1.65	B/C:	1.45
EIRR:	16.4%	FIRR:	15.5%

Economic/Financial Analysis of Project

Sheet No. 4

Name of Project:	Construction of By-pass Channel Raven-Rechica							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								44,000
Sub-total (Civil work cost)								44,000
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (10% of C/W cost)								4,400
Financial cost								44,000
Economic cost (90% of financial cost)								39,600

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					6,875
Sub-total					
II. Irrigation benefit					7,121
1 Water charge					
Sub-total					
Note:					
Total				0.0	0

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-6,206 US$10^3	B-C:	-12,571 US$10^3
B/C:	0.92	B/C:	0.86
EIRR:	6.5%	FIRR:	5.1%

Economic/Financial Analysis of Project

Sheet No. 5

Name of Project:	Patishka Reka Water Supply Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Main construction works								
(1) Construction of dam								
(2) Construction of irrigation facilities								
(3) Construction of water supply facility								
a. Filter station	90	l/sec						325
b. Pipelines and auxiliary structures	45,000	m						2,924
(escalation is considered based on the 1995 price)								
Sub-total (Civil work cost)								3,249
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								3,249
2. Indirect cost (50% of direct construction cost)								0
3 Annual O/M cost								325
Financial cost								3,249
Economic cost (90% of financial cost)								2,924

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					0
2 Water supply benefit					
2.1 Domestic water supply (Q=90 lit/s)	16.2	3,405,888		55,175	1,061
Sub-total					1,061
II. Financial benefit (revenue)					
1 Irrigation benefit					0
2 Water supply benefit					
2.1 Domestic water supply (Q=90 lit/s)	18.0	2,951,770		53,132	1,022
Sub-total					1,022
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	3,411 US$10^3	B-C:	2,450
B/C:	1.53	B/C:	1.36
EIRR:	16.5%	FIRR:	13.8%

Economic/Financial Analysis of Project

Sheet No. 6

Name of Project:	Paligrad Multipurpose Dam Project

COST	Work quantity		Unit price		Amount		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Paligard dam	1,677	10^3m^3	6.3	14.7	10,580	24,687	1,834	35,267
(2) Construction of irrigation facilities	1,800	ha	1,500	3,500	2,700	6,300	468	9,000
(3) Construction of water supply facility								
a. Tyrolean intake	0	l/sec						
b. Pipeline (D=180 mm, Q=50 l/sec)	24,000	m	5.4	12.6	130	302	22	432
c. Filter station	1,800	l/sec			180	420	31	600
d. Service reservoir	0	m^3			63	147	11	210
(4) Hydropower facilities	L.S.							2,600
Sub-total (Civil work cost)					13,653	31,856	2,366	48,109
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)					13,653	31,856	2,366	48,109
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								2,608
Financial cost								48,109
Economic cost (90% of financial cost)								43,298

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					3,874
2 Water supply benefit					
2.1 M&I water supply (Q=50 lit/s)	16.2	1,103,760		17,881	344
3 Hydropower benefit					2,500
Sub-total					6,718
II. Financial benefit (revenue)					
1 Irrigation benefit					3,649
2 Water supply benefit					
2.1 Domestic water supply (Q=50 lit/s)	18.0	1,103,760		19,868	382
3 Hydropower benefit					2,800
Sub-total					6,831
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	7,091 US$10^3	B-C:	-3,941 US$10^3
B/C:	1.12	B/C:	0.94
EIRR:	9.7%	FIRR:	7.2%

Economic/Financial Analysis of Project

Sheet No. 7

Name of Project:	Slupchanka Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Slupchanka dam	270	10^3m^3	8.1	18.9	2,185	5,097	379	7,282
(2) Construction of irrigation facilities		ha	1,500	3,500	0	0	0	0
(3) Construction of water supply facility								
a. Tyrolean intake	-	l/sec						
b. Pipeline (D=250 mm, Q=100 l/s)	0	m	21.0	49.0	0	0	0	0
c. Filter station (existing)	0	l/sec					0	0
d. Service reservoir (existing)	0	m^3					0	0
Sub-total (Civil work cost)								7,282
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)								7,282
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								364
Financial cost								7,282
Economic cost (90% of financial cost)								6,554

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					0
2 Water supply benefit					
2.1 M&I water supply (Q=260 lit/s)	16.2	8,199,360		89,960	1,730
Sub-total					
II. Financial benefit (revenue)					
1 Irrigation benefit					0
2 Water supply benefit					
2.1 Domestic water supply (Q=260 lit/s)	18.0	8,199,360		75,920	1,460
Sub-total					
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	6,714 US$10^3	B-C:	4,403 US$10^3
B/C:	1.72	B/C:	1.43
EIRR:	16.0%	FIRR:	13.1%

Benefit and Cost Estimate

Sheet No. 8

Name of Project:	Lipkovo-Glaznja Area Irrigation rehabilitation Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD,mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Irrigation area :	10,820	ha		2,000				21,640
Sub-total (Civil work cost)								
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (5% of C/W cost)								1,082
Financial cost								21,640
Economic cost (90% of financial cost)								19,476

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit					5,669
1 Irrigation benefit (Ref.Appendix)					
(net return)					
Sub-total					
II. Financial benefit					5,478
1					
1.1					
1.2					
Sub-total					
Note:					
Total					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	14,411 US$10^3	B-C:	8,035 US$10^3
B/C:	1.34	B/C:	1.17
EIRR:	13.7%	FIRR:	10.9%

Economic/Financial Analysis of Project

Sheet No. 9

Name of Project:	Kiselichka Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Kiselichka dam	955	10^3m^3	7.2	16.9	6,898	16,096	1,196	22,994
(2) Construction of irrigation facilities	4,500	ha	1,500	3,500	6,750	15,750	1,170	22,500
(3) Construction of water supply facility								
a. Tyrolean intake	-	l/sec						
b. Pipeline (D=200 mm, Q=70 l/sec)	6,000	m	6.0	14.0	36	84	6	120
c. Filter station (existing)	70	l/sec			180	420	31	600
d. Service reservoir (existing)	3,000	m^3			63	147	11	210
Sub-total (Civil work cost)					13,927	32,497	2,414	46,424
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)					13,927	32,497	2,414	46,424
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								3,043
Financial cost								46,424
Economic cost (90% of financial cost)								41,782

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					7,741
2 Water supply benefit					
2.1 M&I water supply (Q=70 lit/s)	16.2	1,103,760		17,881	344
Sub-total					8,085
II. Financial benefit (revenue)					
1 Irrigation benefit					7,301
2 Water supply benefit					
2.1 Domestic water supply (Q=70 lit/s)	18.0	1,103,760		19,868	382
Sub-total					7,683
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	14,901 US$10^3	B-C:	3,395 US$10^3
B/C:	1.22	B/C:	1.05
EIRR:	11.2%	FIRR:	8.7%

Economic/Financial Analysis of Project

Sheet No. 10

Name of Project:	Vakuf Multipurpose Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Vakuf dam	1,560	10^3m^3	0.0	22.5	0	35,100	1,825	35,100
(2) Construction of irrigation facilities	22,000	ha	1,500	3,500	33,000	77,000	5,720	110,000
(3) Construction of water supply facility								
a. Tyrolean intake	-	l/sec						
b. Pipeline (D=180 mm, Q=50 l/sec)	24,000	m	5.4	12.6	130	302	22	432
c. Filter station	50	l/sec			180	420	31	600
d. Service reservoir	2,160	m^3			63	147	11	210
(4) Construction of power facilities		L.S						18,000
Sub-total (Civil work cost)					33,373	112,969	7,610	164,342
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)					33,373	112,969	7,610	164,342
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								10,679
Financial cost								164,342
Economic cost (90% of financial cost)								147,908

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					28,411
2 Water supply benefit					
2.1 M&I water supply (Q=50 lit/s)	16.2	788,400		12,772	246
3 Power benefit					700
Sub-total					29,357
II. Financial benefit (revenue)					
1 Irrigation benefit					28,669
2 Water supply benefit					
2.1 Domestic water supply (Q=50 lit/s)	18.0	788,400		14,191	273
3 Power benefit					1,700
Sub-total					30,642
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	73,462 US$10^3	B-C:	37,340 US$10^3
B/C:	1.33	B/C:	1.15
EIRR:	13.0%	FIRR:	10.1%

Economic/Financial Analysis of Project

Sheet No. 11

Name of Project:	Pelince Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of dam	5,200	10^3m^3	1.8	4.3	9,603	22,406	1,664	32,009
(2) Construction of irrigation facilities	5,000	ha	1,500	3,500	7,500	17,500	1,300	25,000
(3) Construction of water supply facility								
a. Tyrolean intake	0	l/sec						
b. Pipeline (D450 mm, Q=300 l/sec)	2,000	m	25.5	59.5	51	119	9	170
c. Filter station	0	l/sec						
d. Service reservoir	0	m^3						
Sub-total (Civil work cost)					17,154	40,025	2,973	57,179
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)					17,154	40,025	2,973	57,179
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								3,617
Financial cost								57,179
Economic cost (90% of financial cost)								51,461

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					7,667
2 Water supply benefit					
2.1 M&I water supply	16.2	0		0	0
Sub-total					7,667
II. Financial benefit (revenue)					
1 Irrigation benefit					7,601
2 Water supply benefit					
2.1 Domestic water supply	18.0	0		0	0
Sub-total					7,601
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-3,506 US$10^3	B-C:	-13,164 US$10^3
B/C:	0.96	B/C:	0.85
EIRR:	7.3%	FIRR:	5.7%

Economic/Financial Analysis of Project

Sheet No. 12

Name of Project:	Razlovci Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Razrovci dam	940	10^3m^3	0.0	22.5	0	21,150	1,100	21,150
(2) Construction of irrigation facilities	4,000	ha	1,500	3,500	6,000	14,000	1,040	20,000
(3) Construction of water supply facility								
a. Tyrolean intake	-	l/sec						
b. Pipeline (D=250 mm, Q=100 l/sec)	10,000	m	7.5	17.5	75	175	13	250
c. Filter station	100	l/sec			180	420	31	600
d. Service reservoir	4,320	m^3			81	189	14	270
(4) Construction of power facilities		L.S						
Sub-total (Civil work cost)					6,336	35,934	2,198	42,270
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)					6,336	35,934	2,198	42,270
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								2,770
Financial cost								42,270
Economic cost (90% of financial cost)								38,043

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					6,881
2 Water supply benefit					
2.1 M&I water supply (Q=50 lit/s)	16.2	788,400		12,772	246
3 Power benefit					700
Sub-total					7,827
II. Financial benefit (revenue)					
1 Irrigation benefit					6,490
2 Water supply benefit					
2.1 Domestic water supply (Q=50 lit/s)	18.0	788,400		14,191	273
3 Power benefit					1,700
Sub-total					8,462
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	21,527 US$10^3	B-C:	14,840 US$10^3
B/C:	1.37	B/C:	1.23
EIRR:	13.6%	FIRR:	11.1%

Economic/Financial Analysis of Project

Sheet No. 13

Name of Project:	Blatec Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Blatec dam	2,979	10^3m^3	3.2	7.4	9,533	22,045	1,642	31,577
(2) Construction of irrigation facilities	1,000	ha	1,500	3,500	1,500	3,500	260	5,000
(3) Construction of water supply facility								
a. Tyrolean intake	-	l/sec						
b. Pipeline (D=250 mm)	12,000	m	7.5	17.5	90	210	16	300
c. Filter station	100	l/sec			231	539	40	770
d. Service reservoir	4,320	m^3			71	165	12	235
Sub-total (Civil work cost)					11,424	26,458	1,970	37,882
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)					11,424	26,458	1,970	37,882
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								2,109
Financial cost								37,882
Economic cost (90% of financial cost)								34,094

Conditions:
a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)
b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=1,000 ha)					3,485
2 Water supply benefit					
2.1 M&I water supply (Q=100 lit/s)	16.2	1,576,800		25,544	491
Sub-total					3,976
II. Financial benefit (revenue)					
1 Irrigation benefit					3,606
2 Water supply benefit					
2.1 Domestic water supply (Q=100 lit/s)	18.0	1,576,800		28,382	546
Sub-total					4,152
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-11,301 US$10^3	B-C:	-15,027 US$10^3
B/C:	0.77	B/C:	0.72
EIRR:	4.5%	FIRR:	3.7%

Economic/Financial Analysis of Project

Sheet No. 14

Name of Project:	Rechani Multipurpose Dam Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								50,300
(1) Rechani dam								
(includeing appurtenant structure)								
Sub-total (Civil work cost)								
1.2 Mechanical work (5% of C/W)								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (5% of C/W cost)								2,515
Financial cost								50,300
Economic cost (90% of financial cost)								45,270

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^{3}m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit					
1 Water charge	16.2	15,295		247.8	4,765
2 Power benefit					1,100
Sub-total					5,865
II. Financial benefit (revenue)					
1 Water charge	18.0	15,295		275.3	5,294
2 Power benefit					900
Sub-total					6,194
Total				247.8	5,865

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-6,985 US$10^3	B-C:	-10,758 US$10^3
B/C:	0.89	B/C:	0.84
EIRR:	6.5%	FIRR:	5.8%

Economic/Financial Analysis of Project

Sheet No. 15

Name of Project:	Zletovica Multipurpose Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Knezovo dam and water supply facility								68,200
(2) Irrgation facility								
(3) Power facility								
Sub-total (Civil work cost)								68,200
1.2 Mechanical work (5% of C/W)								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (5% of C/W cost)								1,500
Financial cost								68,200
Economic cost (90% of financial cost)								61,380

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^{3}m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit					
1 Water charge					
1.1 Domestic water (Q=1,474lit)	16.2	188,260		3,050	58,650
2 Irrigation benefit					
3 Power benefit					
Sub-total					58,650
II. Financial benefit (revenue)					
1 Water charge					
1.1 Domestic water	18.0	209,178		3,765	72,408
2 Irrigation benefit					
3 Power benefit					
Sub-total					72,408
Note:					
Total					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	1,649 US$10^3	B-C:	875 US$10^3
B/C:	1.03	B/C:	1.01
EIRR:	8.3%	FIRR:	8.1%

Economic/Financial Analysis of Project

Sheet No. 16

Name of Project:	Construction of Irrigation Sub-system "Shtipsko Pole"							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of irrigation facilities (2,773 ha)							Applied in the figure in PIP	13,900
Sub-total (Civil work cost)								
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (10% of C/W cost)								1,390
Financial cost								13,900
Economic cost (90% of financial cost)								

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^{3}m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					
1.1 Irrigation benefit					3,514
					0
Sub-total					
II. Financial benefit (revenue)					3438
1 Irrigation benefit					
1.1					
1.2					
Note:					
Total				0.0	3,514

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	12,744 US$10^3	B-C:	8,931 US$10^3
B/C:	1.49	B/C:	1.31
EIRR:	16.7%	FIRR:	13.6%

Economic/Financial Analysis of Project

Sheet No. 17

Name of Project:	Krapa Dam Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Krapa dam	0	10^3m^3	3.2	7.4	0	0	0	0
(2) Construction of intake shaft	1	nos.			150	350	26	500
(3) Construction of branket	500,000	m^3	7.2	16.7	3,600	8,350	621	11,950
(4) Construction of irrigation facilities	8,000	ha	1,500	3,500	12,000	28,000	2,080	40,000
(5) Construction of water supply facility								
a. Tyrolean intake	100	l/sec	10.8	25.2	1	3	0	4
b. Pipeline (D=250 mm)	30,000	m	7.5	17.5	225	525	39	750
c. Filter station	100	l/sec					40	770
d. Service reservoir	4,320	m^3					12	235
Sub-total (Civil work cost)					15,976	37,228	2,819	54,209
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)					15,976	37,228	2,819	54,209
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								3,376
Financial cost								54,209
Economic cost (90% of financial cost)								48,788

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=8,000 ha)					7,080
2 Water supply benefit					
2.1 M&I water supply (Q=100 lit/s)	16.2	1,576,800		25,544	491
Sub-total					7,571
II. Financial benefit (revenue)					
1 Irrigation benefit					7,218
2 Water supply benefit					
2.1 Domestic water supply (Q=100 lit/s)	18.0	1,576,800		28,382	546
Sub-total					7,764
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-2,019 US$10^3	B-C:	-8,274 US$10^3
B/C:	0.97	B/C:	0.90
EIRR:	7.6%	FIRR:	6.5%

Economic/Financial Analysis of Project

Sheet No. 18

Name of Project:	Zhvan Dam Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of Zhvan dam	1,465	10^3m^3	6.6	15.3	9,669	22,415	1,668	32,084
(2) Construction of irrigation facilities	19,000	ha	1,500	3,500	28,500	66,500	4,940	95,000
Sub-total (Civil work cost)								127,084
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)								127,084
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								9,204
Financial cost								127,084
Economic cost (90% of financial cost)								114,375

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=19,000 ha)					21,858
Sub-total					21,858
II. Financial benefit (revenue)					
1 Irrigation benefit					22,040
Sub-total					22,040
Note:					

Economic/Financial Analysis of Project

Sheet No. 19

Name of Project:	Obednik Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of Obdenik dam	1,631	10^3m^3	6.4	14.9	10,385	24,231	1,800	34,616
(2) Construction of irrigation facilities	2,000	ha	1,500	3,500	3,000	7,000	520	10,000
Sub-total (Civil work cost)					13,385	31,231		44,616
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								44,616
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								2,531
Financial cost					13,385	31,231		44,616
Economic cost (90% of financial cost)					12,046	28,108		40,155

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=2,000 ha)					4,956
Sub-total					4,956
II. Financial benefit (revenue)					
1 Irrigation benefit					4,898
Sub-total					4,898
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-11,463 US$10^3	B-C:	-18,396 US$10^3
B/C:	0.80	B/C:	0.71
EIRR:	5.0%	FIRR:	3.4%

Economic/Financial Analysis of Project

Sheet No. 20

Name of Project:	Kochishte Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of Kochishte dam	2,500	10^3m^3	5.3	12.3	13,166	30,721	2,282	43,888
(2) Construction of irrigation facilities	4,500	ha	1,500	3,500	6,750	15,750	1,170	22,500
Sub-total (Civil work cost)					19,916	46,471		66,388
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								66,388
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								3,994
Financial cost					19,916	46,471		66,388
Economic cost (90% of financial cost)					17,925	41,824		59,749

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=4,500 ha)					7,964
Sub-total					7,964
II. Financial benefit (revenue)					
1 Irrigation benefit					8,120
Sub-total					8,120
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-13,486 US$10^3	B-C:	-21,764 US$10^3
B/C:	0.85	B/C:	0.78
EIRR:	5.7%	FIRR:	4.5%

Economic/Financial Analysis of Project

Sheet No. 21

Name of Project:	Zhurche Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of Zhurche dam	544	10^3m^3	7.7	18.1	4,213	9,830	730	14,042
(2) Construction of irrigation facilities	1,500	ha	1,500	3,500	2,250	5,250	390	7,500
Sub-total (Civil work cost)					6,463	15,080		21,542
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)								21,542
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								1,302
Financial cost					6,463	15,080		21,542
Economic cost (90% of financial cost)					5,816	13,572		19,388

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=1,500 ha)					2,655
Sub-total					2,655
II. Financial benefit (revenue)					
1 Irrigation benefit					2,707
Sub-total					2,707
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-3,768 US$10^3	B-C:	-6,448 US$10^3
B/C:	0.87	B/C:	0.80
EIRR:	6.0%	FIRR:	4.8%

Economic/Financial Analysis of Project

Sheet No. 22

Name of Project:	Konjarka Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of Konjarka dam	356	10^3m^3	8.0	18.6	2,842	6,630	493	9,472
(2) Construction of irrigation facilities	3,000	ha	1,500	3,500	4,500	10,500	780	15,000
Sub-total (Civil work cost)					7,342	17,130		24,472
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)								24,472
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								1,674
Financial cost					7,342	17,130		24,472
Economic cost (90% of financial cost)					6,607	15,417		22,025

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=3,000 ha)					3,874
Sub-total					3,874
II. Financial benefit (revenue)					
1 Irrigation benefit					3,584
Sub-total					3,584
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	2,076 US$10^3	B-C:	-4,401 US$10^3
B/C:	1.06	B/C:	0.88
EIRR:	8.9%	FIRR:	6.2%

Economic/Financial Analysis of Project

Sheet No. 23

Name of Project:	Studenchca Supplemental Water Supply Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of dam		10^3m^3						
(2) Construction of irrigation facilities		ha						
(3) Construction of water supply facility								
a. Tyrolean intake	-	l/sec						
b. Pipeline (D=800 mm)	7,000	m	245	105	1,715	735	127	2,450
c. Filter station	-	l/sec						
d. Service reservoir	-	m^3						
Sub-total (Civil work cost)								2,450
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								2,450
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost (5% of main construction cost)								123
Financial cost								2,450
Economic cost (90% of financial cost)								2,205

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A-4,000 ha)					
2 Water supply benefit					
2.1 M&I water supply (Q=250 lit/s)	1.62	7,884,000		12,772	246
Sub-total					246
II. Financial benefit (revenue)					
1 Irrigation benefit					
2 Water supply benefit					
2.1 Domestic water supply (Q=200 lit/s)	1.8	7,884,000		14,191	273
Sub-total					273
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-896 US$10^3	B-C:	-1,043 US$10^3
B/C:	0.75	B/C:	0.74
EIRR:	2.2%	FIRR:	2.0%

Economic/Financial Analysis of Project

Sheet No. 24

Name of Project:	Petrushaka Dam Project							
COST	Work quantity		Unit price		Amount		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of Petrushka dam	2,079	10^3m^3	5.8	13.5	12,058	28,135	2,090	40,192
(2) Construction of irrigation facilities	5,000	ha	1,500	3,500	7,500	17,500	1,300	25,000
Sub-total (Civil work cost)					19,558	45,635		65,192
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								65,192
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								4,010
Financial cost					19,558	45,635		65,192
Economic cost (90% of financial cost)					17,602	41,071		58,673

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=5,000 ha)					9,690
Sub-total					9,690
II. Financial benefit (revenue)					
1 Irrigation benefit					9,435
Sub-total					9,435
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	3,418 US$10^3	B-C:	-8,596 US$10^3
B/C:	1.04	B/C:	0.91
EIRR:	8.6%	FIRR:	6.7%

Economic/Financial Analysis of Project

Sheet No. 25

Name of Project:	Kovanska Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of Kovanska dam	903	10^3m^3	7.3	17.0	6,582	15,358	1,141	21,941
(2) Construction of irrigation facilities	2,000	ha	1,500	3,500	3,000	7,000	520	10,000
Sub-total (Civil work cost)					9,582	22,358		31,941
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								31,941
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								1,897
Financial cost					9,582	22,358		31,941
Economic cost (90% of financial cost)					8,624	20,123		28,747

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=6,690 ha)					4,174
Sub-total					4,174
II. Financial benefit (revenue)					
1 Irrigation benefit					3,774
Sub-total					3,774
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-3,096 US$10^3	B-C:	-11,475 US$10^3
B/C:	0.93	B/C:	0.75
EIRR:	6.9%	FIRR:	4.1%

Economic/Financial Analysis of Project

Sheet No. 26

Name of Project: Konsko Dam Project

COST	Work quantity		Unit price		Amount		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Construction of Konsko dam	1,500	10^3m^3	6.5	15.2	9,800	22,866	1,699	32,666
(2) Construction of irrigation facilities	6,690	ha	1,500	3,500	10,035	23,415	1,739	33,450
Sub-total (Civil work cost)					19,835	46,281		66,116
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)								66,116
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								4,309
Financial cost					19,835	46,281		66,116
Economic cost (90% of financial cost)					17,851	41,653		59,504

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=6,690 ha)					9,974
Sub-total					9,974
II. Financial benefit (revenue)					
1 Irrigation benefit					10,099
Sub-total					10,099
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	2,791 US$10^3	B-C:	-6,041 US$10^3
B/C:	1.03	B/C:	0.94
EIRR:	8.4%	FIRR:	7.1%

Benefit and Cost Estimate

Sheet No. 27

Name of Project:	Valandovo Area Irrigation Rehabilitation Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
Consruction of irrigation area	3,624	ha		2,000				7,254
Sub-total (Civil work cost)								7,254
1.2 Mechanical work (5% of C/W)								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (5% of C/W cost)								363
Financial cost								7,254
Economic cost (90% of financial cost)								6,529

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit (Ref.Appendix)					2,250
1 Water charge					
1.1					
1.2					
(50 % increase of current tariff)					
Sub-total					
II. Financial benefit (revenue)					2,320
1					
1.1					
1.2					
Sub-total					
Note:					
Total					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	9,996 US$10^3	B-C:	9,289 US$10^3
B/C:	5.60	B/C:	1.66
EIRR:	20.1%	FIRR:	18.4%

Economic/Financial Analysis of Project

Sheet No. 28

Name of Project:	Irrigation Sysytem Betterment Project in Resen							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Rehabilitation cost	5,955	ha						4,262
(2) Equipment cost	LS							228
(3) Post-harvest facility cost	LS							2,490
(4) Secondary/tertiary network		km						8,068
Sub-total (Civil work cost)								15,048
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								7,524
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (10% of C/W cost)								1,505
Financial cost								22,572
Economic cost (90% of financial cost)								20,315

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^{3}m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=5,955 ha)					5,920
2 Water supply benefit					
2.1 M&I water supply (Q=100 lit/s)	16.2	0		0	0
Sub-total					5,920
II. Financial benefit (revenue)					
1 Irrigation benefit					6,380
2 Water supply benefit					
2.1 Domestic water supply (Q=100 lit/s)	18.0	0		0	0
Sub-total					6,380
Note:					
Total					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	30,444 US$10^3	B-C:	31,660 US$10^3
B/C:	1.89	B/C:	1.83
EIRR:	20.4%	FIRR:	19.6%

Benefit and Cost Estimate

Sheet No. 29

Name of Project:	Ohrid Area Irrigation Rehabilitation Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	($US10^3$)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Irrigation area :	4,100	ha		2,000				8,200
Sub-total (Civil work cost)								
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (5% of C/W cost)								410
Financial cost								8,200
Economic cost (90% of financial cost)								7,380

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.mil.)	($US10^3$)
I. Economic benefit					4,845
1 Irrigation benefit (Ref.Appendix)					
(net return)					
Sub-total					
II. Financial benefit					4,736
1					
1.1					
1.2					
Sub-total					
Note:					
Total					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	6,098 $US10^3$	B-C:	539 $US10^3$
B/C:	1.14	B/C:	1.01
EIRR:	10.5%	FIRR:	8.2%

Economic/Financial Analysis of Project

Sheet No. 30

Name of Project:	Podares Dam Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Podares dam	4,162	10^3m^3	3.2	7.4	13,318	30,799	2,294	44,117
(2) Construction of irrigation facilities	4,000	ha	1,500	3,500	6,000	14,000	1,040	20,000
(3) Construction of water supply facility								
a. Tylorian intake	-	l/sec						
b. Pipeline (D=250 mm)	30,000	m	7.5	17.5	225	525	39	750
c. Filter station	200	l/sec					60	1,150
d. Service reservoir	8,640	m^3					17	325
Sub-total (Civil work cost)					19,543	45,324	3,450	66,342
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)					19,543	45,324	3,450	66,342
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								4,028
Financial cost								66,342
Economic cost (90% of financial cost)								59,708

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit (A=4,000 ha)					7,103
2 Water supply benefit					
2.1 M&I water supply (Q=200 lit/s)	16.2	3,153,600		51,088	982
Sub-total					8,085
II. Financial benefit (revenue)					
1 Irrigation benefit					6,515
2 Water supply benefit					
2.1 Domestic water supply (Q=200 lit/s)	18.0	3,153,600		56,765	1,092
Sub-total					7,607
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	-12,278 US$10^3	B-C:	-26,447 US$10^3
B/C:	0.86	B/C:	0.73
EIRR:	5.9%	FIRR:	3.6%

Economic/Financial Analysis of Project

Sheet No. 31

Name of Project:	Oraovica Dam Project

COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (US$)	F/C (US$)	D/C (US$10^3)	F/C (US$10^3)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works (10%of C/W)								
1.1.2 Main construction works								
(1) Construction of Oraovica dam	890.0	10^3m^3	7.3	17.0	6,502	15,172	1,127	21,674
(2) Construction of irrigation facilities	0	ha	1,500	3,500	0	0	0	0
(3) Construction of water supply facility								
a. Tyrolean intake	0	l/sec						
b. Pipeline (D450 mm, Q=300 l/sec)	0	m						
c. Filter station	0	l/sec						
d. Service reservoir	0	m^3						
Sub-total (Civil work cost)							1,127	21,674
1.2 Mechanical work (included in C/W cost)								
1.3 Electrical work (included in C/W cost)								
Sub-total (Direct construction cost)							1,127	21,674
2. Indirect cost								
Included in Direcet construction cost								
3 Annual O/M cost								1,084
Financial cost								21,674
Economic cost (90% of financial cost)								19,506

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999)

b.

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.10^3)	(US$10^3)
I. Economic benefit					
1 Irrigation benefit					0
2 Biological minimum (Q=100 l/sec)	47.0	3,154		148,219	2,850
Sub-total					2,850
II. Financial benefit (revenue)					
1 Irrigation benefit					0
2 Biological minimum (Q=100 l/sec)	51.0	3,154		160,834	3,093
Sub-total					3,093
Note:					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	435 US$10^3	B-C:	-287 US$10^3
B/C:	1.02	B/C:	0.99
EIRR:	8.2%	FIRR:	7.9%

Benefit and Cost Estimate

Sheet No. 32

Name of Project:	Mantovo Area Irrigation Rehabilitation Project							
COST	Work quantity		Unit price		Amout		Total amount	
Item	Amount	Unit	D/C (MKD)	F/C (US$)	D/C (MKD)	F/C (US$)	(MKD.mil.)	(US$10^3)
1. Direct construction cost								
1.1 Civil work								
1.1.1 Preparatory works								
1.1.2 Main construction works								
(1) Irrigation area :	5,581	ha		2,000				11,162
Sub-total (Civil work cost)								
1.2 Mechanical work								
1.3 Electrical work								
Sub-total (Direct construction cost)								
2. Indirect cost (50% of Direect construction cost)								
(including land acquisition and compensation, engineering fee,								
administration cost and physical/price contingencies)								
3 Annual O/M cost (5% of C/W cost)								558
Financial cost								11,162
Economic cost (90% of financial cost)								10,046

Conditions:

a. Exchage rate : US$1.0= MKD52. (Jan.15, 1999 by The National Bank)

BENEFIT	Unit rate	Quantity		Total amount	
Item	(MKD/m^3)	(10^3m^3/year)		(MKD.mil.)	(US$10^3)
I. Economic benefit					5,360
1 Irrigation benefit (Ref.Appendix)					
(net return)					
Sub-total					
II. Financial benefit					5,023
1					
1.1					
1.2					
Sub-total					
Note:					
Total					

RESULT OF ECONOMIC/FINANCIAL EVALUATION

B-C:	11,296 US$10^3	B-C:	3,441 US$10^3
B/C:	1.26	B/C:	1.07
EIRR:	12.5%	FIRR:	9.3%