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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL DEVELOPMENT ASSOCIATION

APPRAISAL OF THE

IBAR MULTIPURPOSE WATER PROJECT

YUGOSLAVIA

April 19, 1971

Public Utilities Projects Department

Public Disclosure Authorized

CURRENCY EQUIVALENTS

Currency Unit	=	Yugoslav Dinar (Din)
US$ 1	=	Din 15.0
US$ 1 million	=	Din 15,000,000
Din 1	=	US$ 0.067
Din 1 million	=	US$ 66,667

ABBREVIATIONS AND ACRONYMS

mm	=	millimeter (1 millimeter = 0.039 inches)
m	=	meter (1 meter = 3.28 feet)
km_2	=	kilometer (1 $kilometer_2$ = 0.62 miles)
km^2	=	square kilometer (1 km^2 = 100 hectares = 247.1 acres)
ha	=	hectare (1 hectare = 10,000 square meters = 2.47 acres)
m^3	=	cubic meter (1 m^3 = 1.31 cubic yards = 264.2 US gallons)
m^3/sec	=	cubic meters per second (1 m^3/sec = 264.2 US gallons/second = 35.3 cubic feet/second)
kv	=	kilovolt
Mw	=	megawatt
kwh	=	kilowatt hour
Gwh	=	gigawatt hour (1 Gwh = 1,000,000 kwh)
ILE	=	Ibar-Lepenac Enterprise
FAO	=	Food and Agriculture Organization
UNDP	=	United Nations Development Program
WHO	=	World Health Organization
ZEPS	=	Association of Electricity Producers of Serbia

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This report -- prepared by Messrs. Jacob, Grover, Mould, Warford, Isla and Montfort, Miss Eid, Messrs. Golan, Meimaris, Rashid and Smeyers -- is based on the findings of Bank appraisal missions which visited Yugoslavia in June and August 1970. The water supply and irrigation mission in June consisted of Messrs. Jacob, Grover and Meimaris with Miss Eid and Mr. Smeyers of the FAO/IBRD Cooperative Program. The later power mission consisted of Messrs. Isla and Montfort.

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SUMMARY AND CONCLUSIONS

i. Kosovo Province is the poorest region in Yugoslavia. Income per capita (about US$170 per year) is about one third of the national average and high rates of unemployment and underemployment prevail. Planned expansion of mineral-based industries in the Kosovo plain is inhibited by lack of additional water supplies. Public health in the region is very poor, partly because of inadequate domestic water supplies. Although the economy of the region is basically agricultural, Kosovo Province does not produce enough food to be self-sufficient. The Ibar-Lepenac scheme will provide basic infrastructure for accelerated economic development in the province; its first stage, the Ibar project, is the subject of this appraisal.

ii. The multipurpose Ibar project envisages utilization of the water of the Ibar River for (a) industrial and domestic consumption, (b) intensification of agriculture through irrigation, and (c) the generation of hydroelectric power.

iii. The part of the project for which Bank financing is proposed is estimated to cost US$93.3 million and would include two dams, a 34 Mw hydroelectric station, 147 km of principal conduits, two pumping stations, irrigation and drainage networks covering 30,000 ha, roads, land levelling, operation and maintenance equipment, and engineering services. Minor components of the project to be implemented without Bank assistance are estimated to cost US$8.9 million and include erosion control measures, river levees, a transmission line and on-farm investments.

iv. The economic rate of return of the entire Ibar project, whose main effects would be in the industrial and agricultural sectors, is estimated to be 15.6%. Besides the quantified benefits expected from water supply, agriculture, power, and prevention of downstream sedimentation, improvements in domestic water supply will bring substantial public health benefits. Additional benefits will result from flood control and reduced soil erosion.

v. A Bank loan of US$45 million is proposed, which would cover 42% of the Bank-financed project costs plus interest on the Bank loan during construction (US$6.2 million). The remaining 58% will be financed locally, mainly by a loan from a special fund for underdeveloped areas channelled through a local bank. The Bank loan will finance the estimated foreign exchange component of US$29.2 million (including interest during construction on the Bank loan) and local currency expenditures equivalent to about US$15.8 million.

vi. The Bank will lend to the Federal Government of Yugoslavia which will relend the funds, on Bank terms, to the Ibar-Lepenac Enterprise (ILE). This new entity, created specifically to develop the water resources of the

Ibar and Lepenac river systems, will construct the project. A project agreement with the Bank would be co-signed by the Provincial Government of Kosovo and ILE.

vii. ILE will operate as an independent utility and a wholesaler of water and electricity. More than 70% of its estimated future revenue will be assured by firm contracts for the sale of water and electricity to main industrial users. While these customers will provide most of the revenue required to maintain a sound financial position of ILE, revenue from sales to agricultural users of water (at rates commensurate with their ability to pay) would cover operating and maintenance costs of the irrigation component and would provide for repayment of the proportionate investment for irrigation within about 50 years.

viii. ILE will be required to maintain a minimum rate of return on reasonably valued total net fixed assets in operation of 7% after the first full year of operation and 8% after the fifth year. A further requirement will ensure that ILE would not incur any long-term debt unless the maximum annual future debt service on all debt will be covered not less than 1.2 times by its net revenue at the time of the incurrence of the new debt.

ix. To achieve the full benefits of this complex project will require technical expertise in several fields and the successful coordination of programs of the Federal and Provincial Governments, ILE and autonomous enterprises and communities in Kosovo. Skillful management will be necessary. Realistic plans to provide the necesssary coordination have been made and prospects for sound management of the project are good.

x. The project is suitable for a Bank loan of US$45 million for a period of 30 years, including a 6-year grace period, on the basis of agreements reached during negotiations.

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IBAR MULTIPURPOSE WATER PROJECT

I. INTRODUCTION

1.01 The Federal Government of Yugoslavia has requested a Bank loan of US$45 million to help finance the Ibar project, whose total cost is estimated to be US$102.2 million.

1.02 This multipurpose project, as the first phase of the Ibar-Lepenac scheme to develop the major water resources in the Kosovo plain, would utilize the water of the Ibar River to supply industries and communities, generate hydroelectric power, and irrigate some 30,000 ha in Kosovo Province. The overall scheme is the principal means by which the economic development of this most underdeveloped region in Yugoslavia is planned to be accelerated.

1.03 This loan will be the first one to Yugoslavia for water supply or agriculture. Two previous loans have been made for power, the most recent of which was 318-YU for US$30 million.

1.04 Following completion of a feasibility study and detailed design of most of the Ibar project components by Yugoslav consultants (Energoproject of Belgrade), a Bank reconnaissance mission visited the project area in April 1969. FAO/IBRD Cooperative Program missions were in Yugoslavia to prepare the agricultural component of the project in September 1969 and January 1970. After a preappraisal mission of combined Bank and FAO/IBRD staff in May 1970, the project's water supply and irrigation aspects were appraised in June 1970 by Messrs. Jacob, Grover and Meimaris of the Bank and Miss Eid and Mr. Smeyers of FAO/IBRD, with guidance from Mr. Bartsch. Messrs. Isla and Montfort appraised the power component in August 1970. This report is based on information obtained by these missions and provided by the consulting engineers and the Governments of Yugoslavia and Kosovo Province. Assistance in the preparation of the report was given by Messrs. Golan, Mould, Rashid and Warford.

II. THE ECONOMY OF THE REGION

A. General

2.01 The Socialist Autonomous Province of Kosovo, with a per capita income of about US$170 per year or one-third the national average, is the poorest region in Yugoslavia. Bordering Albania (see Map 1), with most of the 1.2 million people of Albanian origin, the Province occupies an area of 11,000 km^2 out of the country's total area of 256,000 km^2. The Kosovo population density of 110 per km^2 is almost 40% higher than that of the country, whose population totals 20.5 million.

2.02 Some 75% of the people in this underdeveloped rural Province live on farms or in small villages. The largest city is Pristina, the Provincial capital, with 65,000 inhabitants who include 10,000 university students. High unemployment and underemployment are growing problems in Kosovo, whose 2.85% net annual rate of population increase is more than double that of the country as a whole.

2.03 Largely because of the rapid population growth in the Province, its per capita income has not increased as fast as the national average over the past 10 years. This has occurred despite significant efforts of the Federal Government to promote Kosovo's economic development, mainly through funds provided from the Fund for Lesser Developed Regions and Republics. These payments amounted to Din 2,190 million (US$146 million), or 39% of all investment in the Province, in the 5-year period to 1970. Still greater financial assistance from the Fund -- estimated at Din 5,650 million (US$377 million) or 43% of all investment planned for the Province -- is envisaged in the draft of the next 5-Year Plan (1971-1975).

B. Industrial Sector

2.04 Most industry in Kosovo Province is based on the mineral resources of the Kosovo plain, exploited by two large industrial enterprises. The extensive lead and zinc deposits were first mined about 40 years ago by Kombinat Trepca, whose several mines in the area now supply the smelter, refinery and chemical complex around Kosovska Mitrovica, employing 6,500 people there. Yugoslavia is Europe's second largest producer of lead and Kombinat Trepca, the major supplier in the country, is an important exporter. In addition to refined lead, zinc and associated minerals, this enterprise manufactures superphosphate fertilizer, sulphuric acid and lead batteries.

2.05 Major reserves of lignite near Obilic are the basis for the various integrated operations of Kombinat Kosovo, which employs 5,000 people and runs a highly automated open-cast mining operation to supply the lignite to its several adjacent plants. These include a coal-drying plant, a 390 Mw thermal power plant (whose capacity is being doubled) and a gasification plant. Both the power and gasification plants are principal suppliers to the steel industry in Skopje, 90 km away. Development of nitrogen fertilizer and caprolactam 1/ plants is planned by Kombinat Kosovo for the near future.

2.06 The Province's secondary industries, such as food-processing and textiles, are relatively small and geographically dispersed. All industries together employ only about 35,000 people.

1/ Caprolactam is synthesized from coal and used in the manufacture of nylon.

2.07 Expansion of industry, particularly the mineral-based enterprises of the Kosovo plain, is the main basis for economic development in the Province. In the period 1966-70, 66% of all investment was for industry, and the next 5-Year Plan (1971-75) envisages 52% of all investment for this sector. But the planned expansion of the two main Kombinats is inhibited by the lack of additional water supplies that will be needed.

C. Water Supply Sector

2.08 Water supply facilities in Kosovo Province are generally planned, financed, built and operated by their users, the industries and communities. Each of the two main industrial complexes has its own water supply scheme at present, as do nine towns in the Province. Details of existing schemes are in Annex 6. See also Map 2.

2.09 Kombinat Trepca at Kosovska Mitrovica obtains its water supply (for flotation, washing, cooling, etc.) from unregulated flows in the Ibar River by means of the Preles weir and supply system and by direct pumping from the river. Present water requirements exceed the dependable river flow. Kombinat Kosovo at Obilic obtains its water supply by pumping from the Lab River at Prugovac. When development of the area's lignite reserves began, this industry was allowed to use the Batlava reservoir -- originally built for irrigation -- to augment low flows and increase the dependable water supply. Although most of the water used by the Kombinat (mainly for cooling purposes) is recirculated, the present supply cannot meet the demand associated with the planned industrial expansion at Obilic.

2.10 The amount of water presently used by these industrial complexes can only be estimated because the existing supplies are not metered. The Kombinats have agreed to install water meters and the consultants are providing technical advice for implementation of the metering program. Nevertheless present water use is reasonably estimated and there is no doubt that the demand for industrial water expected in the near future will exceed the capacity of present supplies.

2.11 Public water supplies in nine towns serve an estimated 10% of the provincial population of 1.2 million. Only Pristina, the capital and largest town in the Province, has a satisfactory water supply. The other supplies are unsanitary, tending to be centralized distributors of waterborne infections; this in turn results in an extremely high incidence of intestinal disease, with frequent epidemics. About 90% of the population obtain their water from shallow wells, springs and streams, most of which are polluted.

D. Agricultural Sector

2.12 Although over 400,000 ha (about 40% of the land area) are under cultivation and the economy is basically agricultural, Kosovo Province is nevertheless a net food importer except for meat. Most of the cultivated land is in the Metohija and Kosovo plains, with cereals the predominant crop. There is also a limited production of vegetables and fodder. The

crop production is loosely integrated with livestock production on the hill pastures.

2.13 Irrigation is concentrated in the Metohija plain, which is larger than the Kosovo plain and has more water resources and a milder climate, hence is the more productive part of the Province. About 40,000 ha in the Metohija plain are served by centuries-old systems and 19,000 ha by newer systems built since 1959 (see Map 1). The existing systems are operated as independent utilities and must meet all annual operation and maintenance costs and debt service from water charges. Farmers served by these systems are obliged to use the water; if they fail to do so for two consecutive years, their land is taken over by the Provincial Government and the farmers are given land in a non-irrigated area. There are well-established procedures for creating and organizing water management enterprises to provide water for irrigation schemes. Irrigation is an essential means of intensifying agricultural production in this area.

2.14 In the project area (see Map 2), about 78% of the land is owned by some 11,800 private farmers (private sector). Two-thirds of them are at the subsistence level, cultivating farms smaller than 2 ha (30% of the area) under rainfed conditions and providing for large families averaging 5.5 persons. The size of the remaining private farms ranges between 2 to 5 ha (21% of the area) and 5 to 10 ha (27% of the area). None is larger as the size of private holdings of arable land in the Province is limited by law to 10 ha. Only about one-quarter of the land in the private sector receives extension services, fertilizers and other modern inputs including machine cultivation. These inputs are being purchased from service cooperatives attached to entities in the social sector 1/.

2.15 The rest of the land in the project area belongs to the social sector. This consists of one agro-industrial enterprise, Kombinat Kosmet-Export (12% of the area), and six Production Cooperatives (10% of the area). They have their own marketing channels and operate various factories (sugar, oil mill, dairy and slaughterhouse). Although the use of fertilizer and farm machinery by these enterprises is common and brings above-average yields, most of the factories are under-utilized due to inadequate agricultural production (see Annex 8).

E. Power Sector

2.16 The generation, transmission and distribution of electric power in Yugoslavia are the responsibility of a large number of separate enterprises grouped and coordinated on a regional basis. There are six regional systems in the country, the largest being the system of the Republic of Serbia and Kosovo Province, where the Gazivode hydroelectric plant would be located. The 12 generating enterprises and the enterprise for high-voltage

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1/ The social sector of the Yugoslav economy is comprised of all those enterprises whose means of production are owned by the society as a whole. The workers in these socially owned enterprises manage as well as operate them, thus in the management sense they are fully autonomous.

transmission in Serbia and Kosovo are grouped in ZEPS, the Association of Electricity Producers of Serbia. ZEPS buys all power generated by the producers' plants at tariffs established by general agreement every year, based on the planned utilization of the plants in the system. The total installed capacity in the ZEPS system in mid-1970 was 1,991 Mw, of which 865 Mw were hydro and 1,126 Mw thermal. At present, 900 Mw hydro and 610 Mw thermal are under construction. ZEPS' demand forecasts for 1975 are about 15,000 Gwh and 2,900 Mw peak load in its system. In addition, power will be exported to adjacent systems.

2.17 Kombinat Kosovo at Obilic (see paragraph 2.05) is the electric power producer in the Province which under a long term contract sells power to ZEPS. In addition to the 390 Mw thermal plant now operating, two 200 Mw additional units are under construction and plans exist to install a further 1,500 Mw in the next 10 years. The Kombinat's new gasification plant requires a continuous supply of about 25 Mw. The total power requirements in the Province are much less than the generation capacity of the enterprise and power from Obilic is exported to Serbia and Macedonia. Details on the existing situation in the power sector of Serbia and Kosovo Province are included in Annex 9.

III. THE PROJECT

PROJECT DESCRIPTION AND EXECUTION

A. Background

3.01 Realizing that the future development of the lignite reserves and other resources in the Kosovo plain would depend on increased supplies of water, the Provincial Government initiated engineering studies 10 years ago to provide a master plan for development of the water resources. The result of these studies, carried out by Yugoslav consultants (Energoprojekt), is the proposed multipurpose scheme whereby the major undeveloped rivers in the region, the Ibar and Lepenac, would provide water for industries and communities, for irrigation of some 73,000 ha and for hydroelectric power generation. In 1967 the Provincial Government created a new entity, Ibar-Lepenac Enterprise (ILE), to implement this master plan.

3.02 Because of the impending water shortages in the expanding mineral-based industries at Obilic and Kosovska Mitrovica, the Provincial Government selected the Ibar project, the subject of this appraisal report, as the first phase of the overall development. The second phase, the Lepenac project, would not proceed before completion of the Ibar project in 1975 and would provide water mainly for irrigation of 43,000 ha south of and adjacent to the Ibar project area. The Lepenac project, which would include two dams and a small hydroelectric station, is tentatively estimated to cost Din 719 million (US$48 million). The area covered by the proposed Ibar and Lepenac projects is shown on Map 1.

B. Concept of the Project

3.03 The Ibar project will provide water for industrial, municipal, power and agricultural use and will be the first multipurpose water project in the region. Through development of the Ibar River the project will provide water for:

(a) supply of 8.8 m^3/sec to industries;

(b) supply of about 0.2 m^3/sec to communities;

(c) irrigation of 30,000 ha; and

(d) generation of 95 Gwh of peak power annually.

Although Bank financing will be restricted to the facilities to be built by ILE, which will act as a wholesaler of bulk supplies of water and electricity, complementary inputs, particularly for agriculture, will be required to achieve the intended benefits of the project. The Provincial Government will be responsible for ensuring that these additional inputs are provided and will itself undertake certain works to complement those for which ILE will be responsible (see paragraphs 3.04 to 3.06).

C. Description of the Project

3.04 The proposed Ibar project, shown on Map 2 and described in Annex 1, includes the following main features for which ILE will be responsible:

(a) Gazivode rockfill dam and storage reservoir with capacity of 350 million m^3

(b) 34 Mw hydroelectric plant

(c) Pridvorica regulating dam, intake structure and compensation basin

(d) 147 km of main conduits (canals, tunnels, syphons and aqueducts) for conveying untreated water to industries, communities and irrigated areas

(e) two main pumping stations

(f) irrigation and drainage system serving 30,000 ha

(g) feeder roads (about 91 km) and maintenance roads (about 633 km) along irrigation canals and drains

(h) on-farm development in the irrigated area (land-levelling, tile drainage)

(i) erosion control works (hydraulic structures for training the small torrential streams flowing intermittently as tributaries to the Ibar River)

(j) telecommunications system for project operation

(k) equipment for operation and maintenance of project facilities

(l) training of ILE staff for project operation.

This part of the total Ibar project is referred to hereafter as the ILE project.

3.05 Related project facilities for which others than ILE will be responsible include:

(a) soil conservation works in the watershed above the Project area, to be undertaken by the Provincial Government (paragraph 3.18);

(b) levees along the Sitnica River, to be undertaken by the Provincial Government (paragraph 3.19);

(c) transmission line from the hydroelectric station to the regional power system, to be constructed by Kombinat Kosovo (paragraph 3.20);

(d) treatment and distribution systems to use the untreated supplies of bulk water supplied by ILE to industries and communities in the project area, to be undertaken by those water users (paragraphs 3.28 and 3.29).

3.06 Inputs required to ensure the realization of benefits in agriculture include:

(a) maintenance of feeder roads (paragraph 3.17);

(b) extension services (paragraph 3.34);

(c) farm inputs (fertilizers, machinery services, etc.) (paragraph 3.35);

(d) long-term credit for supplementary on-farm investments and annual short-term production credit (paragraph 3.35);

D. Project Costs

3.07 The estimated project costs are summarized below. Details of the expenditures for which ILE will be responsible during the construction and disbursement period 1971-76 are given on a year-by-year basis on Annex 2.

A. Financed by ILE with IBRD Participation

Items	Din Million			US$ Million		
	Local	For-eign	Total	Local	For-eign	Total
Gazivode and Pridvorica Dams	186.0	120.7	306.7	12.4	8.0	20.4
Hydroelectric Plant	36.5	24.5	61.0	2.4	1.7	4.1
Water Conveyance Systems	367.1	112.5	479.6	24.5	7.5	32.0
Miscellaneous Works and Equipment	41.5	9.3	50.8	2.8	0.6	3.4
Land	16.4	-	16.4	1.1	-	1.1
Engineering, Training and Administration	54.3	1.5	55.8	3.6	0.1	3.7
Subtotal	701.8	268.5	970.3	46.8	17.9	64.7
Contingencies:						
Physical	114.7	25.5	140.2	7.6	1.7	9.3
Price	238.5	51.0	289.5	15.9	3.4	19.3
Total	1,055.0	345.0	1,400.0	70.3	23.0	93.3

B. Financed by Others

	Din Million	US$ Million Equivalent
Soil Conservation Works (Erosion Control)	16	1.1
Sitnica River Levees	30	2.0
Transmission Line	5	0.3
On-farm Investments	82	5.5
Total	133	8.9

3.08 The estimate of the project expenditures for which ILE will be responsible was prepared by the consultants, Energoprojekt, the Yugoslav engineering firm that has been working on the Ibar project since its inception (see paragraph 3.15). The project cost is based on final design

for most project components. Preliminary designs exist for the power station, irrigation networks and one main irrigation conduit. Final designs on these items will be completed while construction proceeds on the more expensive elements (dams and multipurpose water conduits) which take longer to build and for which designs are already completed. Excluded from the costs are some Din 6 million (US$0.4 million) already paid for consulting engineering services. The construction costs have been revised to take account of actual unit prices for similar work in Yugoslavia at the beginning of 1971. Provision has been made for physical contingencies of 15% for final designs and 20% where only preliminary designs exist. Following devaluation of the dinar in January 1971, provision has been made for inflation of domestic costs at 8% per year and of foreign costs at 6% per year during the 5-year construction period. With physical and price contingencies amounting to 31% of the total cost of the ILE project the cost estimate should be adequate.

3.09 The project consultants also prepared the cost estimates for all items to be built by others than ILE, except for the Sitnica River levees, where estimates were prepared by the Provincial Government. The cost of that item could change as a result of further studies but no levees would be constructed which are not economically justified (See paragraph 3.19).

3.10 The foreign exchange component of the ILE project cost is estimated as follows:

	Amount (US$ million)	% of ILE Project Cost
Minimum	17.0	18
Maximum	30.0	32
Probable	23.0	25

Foreign contractors are expected to be attracted to the project by the large value of the major contracts. In estimating the probable foreign exchange component it has been assumed that the largest single contract (construction of the Gazivode and Pridvorica dams and the hydroelectric plant) would be won by a foreign contractor and that Yugoslavs would win all other contracts. More than half of the probable foreign exchange component would consist of the cost of construction equipment manufactured outside Yugoslavia and wages and overheads for a foreign contractor. The balance is made up of the foreign exchange element of construction materials 1/ and of equipment, engineering services and training costs.

1/ Yugoslavia is a net importer of steel, cement, asbestos, and crude oil.

E. Loan Amount

3.11 The proposed Bank loan of US$45 million would cover 42% of the ILE project cost of US$93.3 million, plus US$6.2 million for interest during construction on the Bank loan. The loan is expected to cover the foreign exchange component of US$23.0 million and US$15.8 million of the local currency expenditures (this proportion of foreign exchange/local currency financing is subject to possible variation as explained above).

F. Procurement and Disbursement

3.12 All contracts for the supply of equipment and construction of project facilities would be subject to international competitive bidding. Local contractors and suppliers are expected to compete on every contract. Importation of foreign equipment is normally not allowed without a special license, but procurement for Bank-financed projects is exempt from such licenses. A margin of preference for local manufacturers of 15% or customs duty, whichever is lower, will be applied for purposes of bid comparison.

3.13 Disbursement of the Bank loan would be against the actual foreign exchange cost of imported equipment and of training and engineering services. The balance of the loan, covering both foreign and local currency expenditures, would be disbursed as a percentage of all other contracts, whether won by foreign contractors or by Yugoslavs. This disbursement percentage will be 44% of the value of all approved construction contracts Details of the anticipated rate of disbursement of the loan are in Annex 4. Any unused balance of the loan would be cancelled when project construction is completed.

G. Execution of the Project

General

3.14 The complex nature of the Ibar multipurpose water project makes it necessary for several different groups in Kosovo, with a broad range of technical expertise and having responsibility for differing operations, to coordinate their programs in the Ibar project. Planning for the overall project originated in Kosovo and all affected parties have participated in the development of the project to date. A high level of management expertise will be demanded by the Ibar project. The prospects are good that all parties will cooperate effectively and that experienced professional personnel will be employed by them. This assessment is based on the known system of recruitment and management incentives in Yugoslav enterprises and on the good impression so far made by the local authorities who have been responsible for planning the project.

Works by ILE

3.15 That part of the project for which ILE will be responsible will be executed under the supervision of the engineering consultants,

Energoprojekt. This large Belgrade firm, active in international work, has considerable experience in water resources projects; its performance was good in supervising the construction of the Bajina Basta hydroelectric plant, financed under Bank Loan 318-YU. ILE intends to retain Energoprojekt to complete the detailed designs, prepare tender documents and supervise construction. Conclusion of a contract between ILE and Energoprojekt (or other consultants satisfactory to the Bank) to perform these engineering services will be a condition of effectiveness of the proposed loan.

3.16 Project construction for which Bank financing is proposed will be carried out by contractors engaged by ILE under international competitive bidding. Construction is expected to begin in 1971 and be completed in 1975 (see Annex 3). Five years are required for completion of the Gazivode dam and this has established the timing of construction for most of the other components of the project. Except for tunneling and grouting, no construction work during the severe winter season is planned. Limited additional supplies of water should be available for industries, communities and irrigation in the Ibar valley in 1974, but dependable supplies of water for most of the project area cannot be expected before 1976.

3.17 The maintenance roads to be constructed along the irrigation canals and drains will also serve as farm roads. ILE will construct and maintain these roads. ILE will also undertake the reconstruction of existing feeder roads and the construction of new ones in the project area. Assurances have been obtained from ILE and the Provincial Government that the appropriate road authority will be consulted in the design of the feeder roads to be built by ILE and will be responsible for the maintenance of all feeder roads in the area following completion of the project construction. Further assurances have been obtained from ILE that the designs for the proposed feeder roads will be submitted for Bank review and that these roads will not be constructed without prior Bank approval.

Works by Others

3.18 The Provincial Government is responsible for soil conservation works in the catchment areas of the project, including afforestation and terracing. These measures, by retarding runoff and reducing erosion, complement the erosion control structures being built under the ILE project. The Provincial Government will complete soil conservation works in the Project area before the end of construction of the Ibar project 1/.

3.19 To prevent flooding, the Provincial Government has an ongoing program to construct levees along the Sitnica River where most of the project lands are located. Levees have already been completed along some 17.5 km of the river (mainly to protect industrial centers) and a further

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1/ The Provincial Government finances water control projects such as erosion control works and river levees (paragraph 3.19) from its Water Fund. All beneficiaries of projects supplying water, such as the Ibar project, pay a special charge of Din 0.01 per m^3 to this Water Fund.

30 km are planned. Future hydrologic conditions will be different from those on which the original levee designs were based, due to construction of the Batlava and Gracanka dams and the proposed Gazivode dam. Furthermore, the planned irrigation of the valley lands alters the economic justification for levees. The Provincial Government has agreed to have consultants satisfactory to the Bank review the present levee designs and by the end of 1971 submit their revised proposals to the Government and the Bank for agreement. The Provincial Government has also agreed to complete the levee program, as it may be revised by the consultants, before any irrigation networks are constructed in the valley lands that the levees would protect.

3.20 To connect the proposed Gazivode hydroelectric station to the existing transmission system, some 32 km of 110 kv transmission line will be built by Kombinat Kosovo, the principal power producer in the Province. (See paragraph 3.39).

Water Availability

3.21 With the large storage reservoir of Gazivode (350 million m^3), the project will utilize some 92% of the average annual flow in the Ibar River 1/ (determined on the basis of 38 years of discharge records). Abstraction of this water is authorized under existing Yugoslav regulations.

3.22 Operating rules for the reservoir will be required when its full supply capacity is being utilized, after about 1985, to ensure that minor reductions in the water supply during infrequent droughts will be reasonably apportioned among the various users. By the end of 1974 the consultants will complete studies to produce operating rules for the Gazivode reservoir for agreement between ILE and the Bank, so as to ensure the optimum allocation of water supplies to industries and communities, with acceptable shortages for the irrigated area of 30,000 ha, during periods of extended drought. Details of water availability and utilization are in Annex 5.

Land in the Project Area

3.23 ILE will acquire the land for the project structures and reservoirs by purchasing it from the present owners. The Gazivode damsite is uninhabited so the first project work can commence in 1971 with no delay. Land purchase procedures will commence in 1971. Most of the land required is in the Gazivode reservoir area which will not be flooded until 1975. Expropriation procedures can be resorted to if necessary without delaying construction, hence no problems in this respect are anticipated.

3.24 Besides being small (see paragraph 2.14), farm holdings in the project area are often fragmented. At the time the irrigation scheme is implemented, these fragmented holdings would have to be reorganized, preferably by land consolidation. Existing laws and local precedents make such

1/ All water used in the hydroelectric power plant could be reused, as the intake to the water delivery system will be downstream of the plant.

consolidation possible with the consent of two-thirds of the local landowners (see Annex 8). Insofar as practicable, consolidation of land holdings will be undertaken throughout the project area. This consolidation is desirable but since over 90% of the irrigated area will be served by either sprinklers or buried pipes it would not be essential; in areas where consolidation is not practicable, adjustments will be made in farm boundaries so that they will conform to the irrigation and drainage networks layout. Assurances have been obtained that the Provincial Government will undertake a program of land consolidation, or at least such adjustment of property boundaries as may be required, commencing by mid-1972 before construction begins.

Detail Design Studies

3.25 Although a soil survey has been completed, indicating that the land in the project area is generally suitable for irrigation (see Annex 8), a detailed land classification for the entire project area is required for detailed crop planning. This land classification will be completed by the consultants by mid-1972 at a scale of 1:5,000, using standard specifications acceptable to the Bank.

3.26 To determine the economic viability of draining 3,500 ha of low-lying lands along the Sitnica River, a study will be carried out for that area (which forms part of the total project area of 30,000 ha.). This drainage study will be completed by the consultants by the end of 1973 and no construction will commence in the area before ILE and the Bank reach agreement on the study's recommendations.

Project Operation

3.27 As construction of the project components is gradually completed, commencing in 1973-74, ILE will build up its staff and be responsible for operation and maintenance of all project facilities except the hydroelectric plant (see paragraph 3.39). As a safeguard ILE has agreed to have consultants satisfactory to the Bank inspect the dams and power tunnel at least every three years to ensure that the structures are being adequately operated and maintained. The organization proposed for ILE (Annex 11) is satisfactory. Most of the permanent staff will be used for operation and maintenance of the irrigation system, including supervision of portable sprinkler equipment supplied to the farmers, with additional temporary laborers recruited as needed. Before each irrigation season, ILE will consult with the extension service workers to ensure consistency between the farmers' crop plans and the water delivery schedule. The various training facilities for agricultural technicians in the Province can provide sufficient staff to operate the project effectively and specialized training for key professionals is planned during the construction period.

SECTORAL AND ECOLOGICAL ASPECTS OF THE PROJECT

H. Water Supply Aspects

3.28 The industries and communities receiving bulk metered supplies of water at offtakes along the main conduits will have to make the neces-

sary arrangements to treat and distribute the water. Kombinats Trepca and Kosovo presently have their own treatment and distribution systems and will expand them as needed. At Kosovska Mitrovica, consultants (Energoprojekt) have already been retained to design improvements to the water supply system for the town so that water supplied by the Ibar project can be used for domestic purposes when it becomes available there in 1974.

3.29 The other communities in the project area which are expected to utilize Ibar water have made no definite plans to treat and distribute the water after the project becomes operational, although they have already indicated their intention to do so. Consultants will be required to prepare the necessary designs, as neither the Provincial Government nor the individual communities have the required engineering staff. Recently, WHO experts helped the Provincial Government prepare a request for a UNDP study that would analyze the water supply, water pollution and waste disposal problems throughout Kosovo Province and would propose solutions. This study would produce plans for communities in the project area to treat and distribute Ibar water. The UNDP project has not yet been officially requested and if for some reason assistance is not forthcoming through this means, the Provincial Government has agreed to engage consultants satisfactory to the Bank to carry out the necessary studies, which will be completed for the project area by the end of 1973.

3.30 In future, water for the Kosovska Mitrovica area will be supplied by ILE from the proposed project conduits and the existing Preles system (using flows regulated by the upstream Pridvorica and Gazivode dams). The Preles weir and existing delivery system serving Kombinat Trepca, presently owned by the Kombinat, will be turned over to ILE upon completion of the project.

3.31 The Batlava dam and the present water supply system used by Kombinat Kosovo will become redundant when the Ibar project is completed. In about 1985, however, the industrial demand for water at Obilic may begin to exceed the amount which can be provided from Ibar. As Kombinat Kosovo is not certain whether or not it will require additional water at that time it is not presently able to agree to release the Batlava dam for use by others (possibly for irrigation). The intention is to turn over this water supply facility to ILE if Kombinat Kosovo decides that it has no further need for it.

I. Agricultural Aspects

Production, Marketing, Extension Services and Credit

3.32 About 30,000 ha, located in the northern part of Kosovo Province (see Map 1), will be irrigated under this project. This area was determined by the amount of water available after providing about 9.0 m^3/sec to industry and communities. The irrigation water requirements, utilizing 25%

of the annual volume of water supplied by the project, are discussed in Annex 7. Following the introduction of irrigation, the cropping intensity will be substantially increased, mostly through summer crops and the reclamation of meadow lands.

3.33 As a result of the project the main crops in the area, in value terms, would be fodder maize, vegetables, wheat, grain maize, alfalfa and sugar beets. Present yields in the social and private sectors would more than double (see Annex 8, tables 1 and 2). Livestock production would more than triple and the present integration with crop production would be reinforced. With the Province depending on food imports from other parts of the country, the crops and livestock which the project will produce at competitive prices are expected to be marketed without difficulty. Except for vegetables (most sales of which would be directly to consumers in surrounding towns), the private farmers would sell their surplus produce through either agro-industrial enterprises or governmental purchasing agencies. Sugar beet and sunflower production would be processed in the now under-utilized factories of the social sector. Fodder production would be either used on-farm or sold for use by livestock in the area. Beef production would be mainly for export to the European countries, where Yugoslavia is presently finding it difficult to fulfill all of its contract obligations. The projected milk production, roughly half the estimated increase in requirements in Kosovo Province by the mid-1980's, would find a ready market. The Adriatic Sea tourist resorts, soon to be connected to the area by new highways (partially financed under Bank Loan 678-YU), would also provide an outlet for the increased beef and vegetable production. More detailed discussion of agricultural production under the project is in Annex 8.

3.34 Existing agricultural research and education facilities are adequate to meet the project needs. However, the extension services -- presently limited to farmers who belong to service cooperatives -- will have to be strengthened and expanded well ahead of irrigation. To this end, the Provincial Government will prepare a program for the coordination and expansion of extension services to be provided by the existing agricultural organizations and provincial institutions to all farmers in the project area, even if they do not belong to a service cooperative. Assurances have been obtained that the Provincial Government will submit such a program for Bank review by the end of 1971, cause the program to be implemented by mid-1972 and ensure that the necessary funds are made available.

3.35 Following the introduction of irrigation, a total of about Din 82 million (US$5.5 million) of long-term credit would be required by the private and social sectors, mainly for the purchase of farm structures, machinery, equipment and high-quality livestock. The Banka Kosova would provide these funds over a period of five years (see paragraph 6.02). The annual short-term production credit requirements would be about Din 70 million (US$4.7 million) in the social sector and Din 55 million (US$3.7 million) in the private sector. The Popular Bank of Yugoslavia, which is responsible for short-term credit extended through various banking institutions in Kosovo

Province, would provide short-term credit to the social sector. Assurances have been obtained that the Provincial Government will take all appropriate measures, including the provision of the necessary funds, to ensure that all farmers in the project area will have access to credit, farm inputs and farm machinery services.

Water Charges and Farm Income

3.36 From the time of full agricultural development (expected by 1983) the farmers' capacity to pay irrigation water charges will depend on the cropping pattern and the returns from irrigation in the project area. The practice in Kosovo is to set water charges according to the estimated usage of water, based on the irrigated area and the crop grown (see Annex 14). ILE has agreed to carry out a study by mid-1973 to determine the appropriate level of water charges, taking into account the farmers' capacity to pay. The Provincial Government and the Bank will be advised of the findings of this study. ILE will introduce and maintain charges as agreed with the Provincial Government beginning in the first year of irrigation (1974). Preliminary analysis indicates that for the project area as a whole water charges of Din 1,000 (US$67) per ha are realistic up to 1983 and Din 1,100 (US$73) per ha thereafter.

3.37 In the initial period of irrigation the farmers' operations will be inefficient and hence they will have a relatively low (but increasing) capacity to pay water charges. The Provincial Government has agreed with the principle of subsidizing the farmers in the first few years of the project by paying to ILE a portion of their water charges, the amount to be determined following the completion of the study discussed above (paragraph 3.36). ILE will charge only half of the agreed water charges in the first year that the project can provide irrigation water to an area (2,000 ha in 1974 and the remaining 28,000 ha in 1976). In the subsequent four years the farmers will pay an increasing portion of the rates charged by ILE, with the balance being paid by the Provincial Government. Preliminary estimates, outlined in Annex 14, indicate that the Provincial Government would provide about Din 27 million (US$1.8 million) or 25% of the water charges during the initial period (1974-79).

3.38 Full agricultural development is expected in 1983 following a development period of 5 years in the social sector and 7 years for private farmers. The relatively high yields which are then expected have already been achieved under similar circumstances on the irrigation scheme at Prizren, 80 km west of the project area (see Map 1). Cash flows for various sized farms are given in Tables 4, 5 and 6 of Annex 8, based on an average water charge of Din 1,100 (US$73) per ha (which could be modified following the study referred to in paragraph 3.36). The projected farm income, after payment of water charges and deductions for family subsistence, would be US$265 on a representative small farm of 1.5 ha and US$806 on a 4.5 ha farm. While this projected income level would be low by Yugoslav standards, it would be more than four times the present income level in the project area. In the social sector, income per ha would more than triple.

J. Power Aspects

3.39 The important Obilic thermal plant of Kombinat Kosovo, with 790 Mw installed by 1975, is located at the southern end of the ZEPS system in an area where there are practically no other generating plants and where the power demand is relatively small. Most of the generation from Obilic will be exported by long 230 kv and 380 kv lines to Macedonia and to northern Serbia. This situation makes Kombinat Kosovo's plant vulnerable to disturbances on the system, which can cause plant tripouts and general losses of power supply in the area. In such cases, the immediate availability of direct power supply from the proposed 34 Mw Gazivode hydroelectric plant, with its inherently quick self-starting characteristic, would be adequate to prevent shut-downs of the gasification plant and to start up the thermal units at Obilic. Kombinat Kosovo, which would thus benefit directly from Gazivode plant, will enter into an agreement with ILE whereby it will build the 110 kv transmission line (paragraph 3.20), would operate the hydroelectric plant, and would buy all power it generates (95 Gwh per year average) at rates mutually agreed and consistent with the rates set by ZEPS for similar types of generation (see Annex 13). Kombinat Kosovo in turn will sell any surplus power from Gazivode to ZEPS. Details on the operation, use and benefits of the hydroelectric plant are included in Annexes 9 and 10. A draft contract between Kombinat Kosovo and ILE covering construction of the transmission line, operation of the Gazivode hydroelectric plant and the purchase of its power has been reviewed by the Bank and found satisfactory. Signing of this contract will be a condition of effectiveness of the proposed Loan.

K. Ecological Aspects

3.40 Improved water supplies that the project will make possible are expected to significantly improve public health and the quality of living in the project area. No increase in waterborne diseases is expected as a result of the irrigation component. Erosion in the project area will be reduced by the soil conservation and erosion control measures. Downstream of the project, the valley lands will be improved by reduction in flooding and siltation brought about by construction of the Ibar reservoir. The Gazivode dam will create a reservoir about 4 km long with a surface area of some 1,025 ha and submerge some 500 ha of agricultural land. Farmers presently living in the area will be relocated and compensated.

3.41 The project is near the upstream end of a long river system that eventually reaches the Black Sea and serves many downstream users of the river water. Wastes discharged by the two mineral-based industries that will use most of the water provided by the project are already polluting the Sitnica and Ibar Rivers and this pollution will tend to be intensified by the reduction in flows resulting from abstraction of water from the Ibar River by the project. The Government has created water quality standards for all rivers which must be attained by 1975. To comply with these standards, which should greatly reduce river pollution, the principal industries in the project area must install waste treatment facilities. Determination of the appropriate facilities will require a thorough analysis of each com-

plex situation. The Provincial Government has agreed to employ consultants satisfactory to the Bank to complete by the end of 1973 a study of methods of treating the liquid wastes produced by Kombinat Kosovo and Kombinat Trepca. ILE has indicated that it will engage these consultants as it would be able to use the proposed Bank loan to meet possible foreign exchange costs.

3.42 The same two mineral-based industries are also creating an air pollution problem, and the pollution will tend to increase along with the scale of their operations. Preliminary investigations indicate injurious effects from air pollution on workers and residents near the plants. Livestock and crops in the area are also believed to be adversely affected. Yugoslavia has the technical resources to analyze and resolve this air pollution problem. The Provincial Government has agreed to arrange for consultants to complete a study of the situation by the end of 1972 and to propose by mid-1973 the means of gradually reducing the pollution.

IV. BENEFITS AND JUSTIFICATION

4.01 As the country's least developed region and with an annual per capita income only one-third the national average, Kosovo Province has major problems of unemployment and underemployment. The Federal Government gives special emphasis to the Province's economic development, particularly to the building of the necessary infrastructure. The Province accords top priority to implementing the Ibar project as the first phase of the multi-purpose Ibar-Lepenac scheme.

4.02 The demand of industries in the project area for water is expected to triple in the next 15 years, mainly because of the planned rapid expansion of the two mineral-based complexes at Obilic and Kosovska Mitrovica (see Annex 6 for details on water consumption estimates). The Ibar River is the largest in the area and development of that source through the proposed multi-purpose project would be the least cost solution to supplying the estimated demand. This component of the economic benefits of the Ibar project consists of the savings in the estimated annual cost to industries resulting from avoidance of the next highest cost alternative, which without Ibar, would have to go forward. All project benefits are discussed in detail in Annex 10.

4.03 The provision of an adequate and dependable supply of unpolluted water to communities in the project area will be a first step toward the provision of sanitary public water supplies and will be a catalyst for further efforts to improve public health in the area. The incremental cost of supplying this relatively small amount of water through the multi-purpose project is negligible. The benefits of water for communities have been conservatively measured as equivalent to the revenue from water sales. There are additional benefits. The two main industrial complexes in the Province currently have over 20,000 man-days of absenteeism each year caused by infectious intestinal disease, some part of which is attributable to unsanitary water supplies - but how much is not known.

4.04 Benefits of the Ibar project to agriculture are estimated as the increase in farm-gate value of agriculture production, less increased production costs, comparing the area under irrigation with the situation that would have prevailed without the project. For the situation without the project it was assumed that the 1.5% yearly growth rate in net value of production from cereals production in the private sector, which prevailed during the past 20 years, will continue, but that no further significant increases in returns would be obtained in the social sector. Compared with a present net value of production in the project area of Din 31.4 million (US$2.1 million), the provision of water to irrigate 30,000 ha would cause the net value of annual production to rise to Din 155.5 million (US$10.4 million) at full development in 1983 due to higher cropping intensity and increased yields. The project will:

(a) allow the private farmers, which now support a farm population estimated at 65,000, to enter the cash economy from subsistence farming;

(b) reduce underemployment in the agricultural sector; and

(c) increase foreign exchange earnings through increased beef production.

4.05 The proposed 34 Mw hydroelectric plant, with an average annual generation of 95 Gwh that can be regulated daily, would be used mainly for generation of valuable peak power. The plant would also constitute a reserve source of electric power supply to Kombinat Kosovo's industrial complex at Obilic, adequate to prevent shut-downs of the gasification plant and to supply power to start up the thermal generating units in event of disturbances on the power system and a general loss of power in the Province. The benefits to the economy of the project's power component are conservatively estimated as the value of its generation to the regional system under normal operating conditions, based on the price for equivalent power, with a small addition for increased reliability of supply to the Obilic industrial complex.

4.06 Soil conservation works will reduce erosion in the project area. Storage of sediment in the Gazivode reservoir and reduction of sediment in run-off from other parts of the area will result in reduction of siltation in river channels downstream of the project. In recognition of this benefit, which will result in reduced costs of silt removal in downstream reservoirs, the Djerdap hydroelectric/navigation complex on the Danube has agreed to make a capital contribution of Din 70 million (US$4.7 million) for the Ibar project. Benefits of sedimentation control are conservatively estimated as equivalent to the capital contribution of this single downstream beneficiary.

4.07 The soil conservation measures and reservoirs in the project will also reduce flood peaks in the Ibar valley downstream of the project. These benefits have not been quantified and would be modest.

4.08 Air and river pollution in the area should be reduced following the completion of studies and associated remedial action for which the project would be the catalyst (see paragraphs 3.41 and 3.42).

4.09 The economic rate of return of the whole Ibar multipurpose project is conservatively estimated to be about 15.6%. The overall rate of return would remain above 14.1% even under adverse assumptions concerning increased costs and decreased benefits. See Annex 10.

4.10 To ensure that inclusion of individual components of this multipurpose project is warranted, the incremental costs of its three major components (water supply, irrigation and power) and combinations thereof were compared with their benefits. The analysis indicates that inclusion of all project components, as proposed, is justified. The rate of return on incremental costs and benefits of the irrigation component is estimated as 11.5%. All other components have a higher rate of return (see Annex 10).

V. LENDING ARRANGEMENTS AND THE IBAR-LEPENAC ENTERPRISE

A. Lending Arrangements

5.01 The Bank loan would be made to the Federal Government of Yugoslavia, which in turn would conclude a subsidiary loan agreement with ILE. The loan, on the original Bank terms would be relent to ILE. Conclusion of this subsidiary loan agreement would be a condition of effectiveness of the loan.

5.02 In addition to the loan agreement with the Federal Government, the Bank would enter into a joint project agreement with both ILE and the Provincial Government to ensure proper execution and operation of the Ibar project.

B. Ibar-Lepenac Enterprise

i. Organization

5.03 The most important form of business organization in Yugoslavia is the enterprise. Comparable to incorporated companies in other countries, enterprises are formed by registering with the Federal Government. They enjoy considerable independence in the conduct of business and are self-managed by their workers. A summary of the main financial principles and regulations applicable to enterprises is in Annex 12.

5.04 ILE was founded as an enterprise by the Provincial Government on February 28, 1967, and will go through three distinct phases under Yugoslav law.

5.05 During the current phase (1967-1971) ILE is being directed by the Provincial Government and a General Manager as an interim appointee. ILE's

expenses are met from Provincial Government budget allocations and outside staff have worked on a part-time basis to help ILE prepare the project.

5.06 During the second phase (the construction period 1971-1975), ILE will be directed by a 12-member Founders' Council. The Provincial Government will nominate six of the members and ILE's working community will elect the other six. The workers will directly participate in management through referendum and voter meetings and indirectly through representation in the Founders' Council.

5.07 During the third phase, after completion of construction in 1975, ILE will operate as an autonomous enterprise. The Workers' Council (a body elected by the workers of ILE) will appoint a Board of Directors to set policy to be implemented by the appointed General Manager. The Workers' Council has the particular function of deciding about the distribution of net income. It decides about the level of personal income of the workers, the reinvestment of funds internally generated by ILE, and the establishment of reserve funds. Workers' Councils generally recognize the need to retain adequate funds for self-financing of further expansion.

5.08 The internal organizational arrangements proposed for ILE are satisfactory. The responsibilities of consultants and the enterprise have been discussed in paragraphs 3.15, 3.16 and 3.27. Organization charts are in Annex 11.

ii. Management

5.09 The enterprise is now in its first phase and has less than ten employees, including a competent General Manager. The limited management activities to date have been handled well and the prospects for continued sound management of ILE are good.

iii. Accounting and Audit

5.10 The accounting system to be used by ILE is prescribed by the Federal Government and is uniform for all enterprises in Yugoslavia. Bookkeeping follows the double-entry system. The fundamental principle of the Yugoslav system is accounting for the use of assets -- regarded as "social property" entrusted to the working community -- with the objective of measuring the rate of return for the social community. This system of accounting, though different in presentation of financial results than that used in non-socialist countries, is consistent with sound commercial business practices and is expected to provide satisfactory records of ILE's financial operations.

5.11 The accounts of all Yugoslav enterprises are checked and certified once a year by the Social Accounting Service, a department within the National Bank which is independent of Government and Parliament. Agreement has been reached that certified financial statements of ILE will be submitted to the Bank within four months after the end of each fiscal year.

VI. FINANCIAL ASPECTS

A. Financing Plan

6.01 The following analysis of ILE's future financial performance is based on estimated sources and application of funds, income statements and balance sheets for the period 1971 through 1985 (See Annexes 15, 16 & 17). Assumptions made in these estimates are in Annex 14. The financing plan for the construction and disbursement period 1971-1976 is summarized below:

	Dinars	US$	%
	----Million----		
Requirements			
Project Expenditures (paragraph 3.07)	1,400.0	93.3	90
Interest during construction	93.0	6.2	6
Other capital expenditures	3.0	0.2	-
Working capital including cash reserve	54.6	3.6	4
Total Requirements	1,550.6	103.3	100
Sources of Funds			
Internal cash generation	152.4	10.2	-
Less: Debt service	41.8	2.8	-
Net internal cash generation	110.6	7.4	7
IBRD Loan	675.0	45.0	44
Banka Kosova Loan	695.0	46.3	45
Contribution from Djerdap Enterprise	70.0	4.6	4
Total Sources of Funds	1,550.6	103.3	100

6.02 The financing requirements of ILE for the project construction will have to be met mainly through borrowings. ILE's cash generation will be limited because revenue from operations will not be realized before 1974. The Fund for Lesser Developed Regions and Republics is expected to be the principal source of funds, which would reach ILE as part of a loan from Banka Kosova. This local bank is the channel for all capital from the Fund which is destined for Kosovo Province. The Banka Kosova has additional resources, both Federal and local, for projects of this type and it would therefore be capable of providing adequate funds to complete the project. It has completed investment programs of about Din 400 million (US$26.7 million) in each of the past two years. As a condition of effectiveness of the proposed Bank loan the Banka Kosova will sign a loan agreement with ILE whereby it will provide the residual local currency for the construction of the Ibar

project, including possible cost overruns. An additional lender's agreement will also be concluded between IBRD and Banka Kosova, as a condition of effectiveness of the proposed Bank loan, to ensure that the Banka Kosova will meet these commitments and cooperate in the implementation of the project.

6.03 A contract between ILE and Djerdap Enterprise regarding a non-returnable capital contribution of Din 70 million (US$4.6 million) towards construction of the Gazivode dam, which will reduce sedimentation in the downstream Djerdap reservoir, has already been signed.

6.04 The repayment terms proposed for the Bank loan (30 years including 6 years' grace) and for the Banka Kosova loan (32 years including 7 years' grace) are consistent with the intent of the Provincial Government to keep ILE's repayment obligations within its capacity to service the debt and to provide funds for future expansion of ILE without having to raise water charges beyond presently proposed levels. These average water charges (see Annex 13) are expected to be within the capacity of agricultural users to pay (paragraph 3.36 and Annex 14), are satisfactory to the communities and are acceptable to the main industrial users as long-term contract prices for water purchased from ILE (paragraphs 6.07 and 6.10).

6.05 During the period of full operation beginning in 1976, ILE is expected to generate surplus cash that could be used for the partial financing of the Lepenac project, which might be undertaken by ILE in later years. Although no definite plans have yet been made to undertake this second phase of the Ibar-Lepenac scheme, ILE should be able to finance at least 25% of the tentatively estimated future capital expenditures of Din 719 million (US$48 million) from internally generated funds if the Lepenac project were begun after 1980. The remainder would have to be borrowed.

B. Financial Forecasts

6.06 Although Yugoslav financial principles differ from those generally applied in non-socialist countries in the concept of ownership, priority of obligations of an enterprise and disposition of net income, they do recognize the need to generate from revenue sufficient cash to cover all operating expenses (including depreciation) and to provide funds for debt service and additional investments in the business or social facilities for the workers (see Annex 12). The financial forecasts are therefore shown in this report in the format commonly used in the Bank to measure financial performance. Future actual financial statements of ILE, as prepared under Yugoslav regulations, would be reconcilable with these pro forma statements.

6.07 Future revenue from water sales to industry and communities and from electricity sales has been calculated on the basis of rates shown in Annex 13 and are consistent with the rate structure proposed by ILE. Long-term contracts with main consumers for water and electricity would guarantee about 90% of the estimated revenue to be obtained from other than agricultural users; more than 70% of the total estimated future revenue from all users is thereby assured. As conditions of effectiveness of the proposed loan, final contracts satisfactory to the Bank will be signed by ILE and the two industrial enterprises (Kombinats Kosovo and Trepca). These contracts con-

tain provision for adjustment of rates if required, due to changes in construction or operating costs or subsequent changes in valuation of fixed assets. The contracts will be reviewed with the Bank at the time of completion of the project.

6.08 Future revenue estimated to be obtained from the agricultural users has been based on average water charges of Din 1,000 (US$67) per ha of irrigated land from 1974 to 1983 and Din 1,100 (US$73) per ha thereafter which will be applied to the agricultural sector as a whole. Details of the agricultural water charges have been discussed in paragraph 3.37 and Annex 14.

6.09 The objective in determining water rates was to provide ILE with sufficient funds to cover operating costs, debt service and a portion of future capital expenditures. The water rates to be charged by ILE (Annex 13) plus revenues from the sale of electricity would achieve this objective. The range of the financial rates of return on net fixed assets in operation would be as follows:

	1977	1981	1985
		in %	
Financial Rates of Return on Net Fixed Assets in Operation			
Agriculture	1.6	0.3	0.5
Water Supply (industry and communities)	17.2	23.3	23.7
Power	7.2	8.3	9.8
Overall Rates of Return of ILE	7.0	8.2	8.6

6.10 These rates of return are calculated on the net fixed assets in operation allocated to each project component or sector on the basis of separable project costs and an appropriate share of joint project costs (see Annexes 14, 15, 17). They reflect the fact that industrial users are subsidizing the agricultural users who are only paying water charges commensurate with their capacity to pay 1/. The willingness of industrial users to pay higher water charges than those which would result from a proportionate allocation of revenue requirements to each sector is prompted by the fact that the industries would have to develop more expensive alternative water sources for their own use if they did not participate in the Ibar project.

6.11 A 10% increase in project costs, on top of already included contingencies, would result in a decrease of the rates of return by 0.7 to

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1/ If all users had to pay water charges adequate to achieve in 1985 a rate of return of 8% on net fixed assets allocated to their sector the unit price for water would be Din 0.93 per m^3 instead of Din 0.35 now proposed to be charged to agricultural users, whereas industrial users would only have to pay Din 0.16 per m^3 instead of Din 0.49 per m^3.

0.9 percentage points, whereas a 10% decrease in project costs would improve the rates of return by up to 1.3 percentage points. Changes of up to 10% in operating costs would only marginally affect the financial rates of return (see also paragraph 6.15).

6.12 The revenue from the sale of water to agricultural users would permit full coverage of operating costs and repayment of the investment allocated to agriculture in about 50 years which is the expected useful life of the assets. ILE is expected to achieve an annual debt service coverage of 1.3 times after the end of the grace period on its borrowings for the Ibar project (see Annex 16).

6.13 Net cash estimated to accumulate during the period 1977 through 1985 would amount to about Din 281 million (US$18.7 million) and is expected to be used by ILE to finance additional capital expenditures such as the Lepenac project (paragraph 6.05) and to cover part of the incremental debt service on possible further borrowings for irrigation projects.

6.14 The estimated balance sheets for ILE (Annex 17) indicate that the enterprise will build up equity, amounting to Din 458 million (US$30 million) or 30% of total capitalization by 1985, as a result of operating the Ibar project. This will provide an important component of ILE's capital structure, particularly in view of the anticipated need of additional borrowing for further water resource projects.

C. Financial Covenants

6.15 Agreement has been reached whereby ILE will maintain a minimum rate of return on reasonably valued total net fixed assets in operation of 7% after the first full year of operation of the project (1977) and 8% after the fifth year. This will ensure that ILE will generate sufficient cash to cover its operating expenses and debt service and will accumulate surplus cash to make a contribution towards future capital expenditures, which would be difficult to finance entirely from additional borrowings. The electricity and water charges now proposed by ILE (Annex 13) will be sufficient to achieve these rates of return.

6.16 Agreement has also been reached that ILE will not incur any long-term debt unless the amount of net revenue before depreciation in the 12-month period prior to the incurrence of the new debt will be not less than 1.2 times the maximum annual future debt service on all debt, including that to be incurred.

VII. AGREEMENTS REACHED DURING NEGOTIATIONS

7.01 During negotiations it was agreed inter alia that ILE will:

(a) construct the project using competent contractors selected through international competitive bidding (paragraph 3.16);

(b) set and maintain water charges to the various consumers sufficient to yield minimum specified rates of return (paragraph 6.15);

(c) maintain a specified debt service ratio (paragraph 6.16).

7.02 During negotiations it was agreed inter alia that Kosovo Province, which with ILE will sign the Project Agreement, will:

(a) ensure that plans are prepared for communities to utilize the water supplied by the Ibar project (paragraph 3.29);

(b) complete soil conservation works (paragraph 3.18) and river levees (paragraph 3.19) required in the project area;

(c) prepare and implement a program to coordinate and expand agricultural extension services to serve all farmers in the project area (paragraph 3.34);

(d) ensure that all farmers in the project area have access to credit, farm inputs and farm machinery services (paragraph 3.35);

(e) meet a diminishing portion of the irrigation water charges due from farmers during the first few years of project operation (paragraph 3.37);

(f) complete studies concerning water pollution (paragraph 3.41) and air pollution (paragraph 3.42) in the project area.

7.03 The proposed loan would not become effective until:

(a) Signing of a contract with engineering consultants satisfactory to the Bank for project supervision (paragraph 3.15);

(b) conclusion of purchase contracts for water between ILE and the principal industrial consumers, Kombinat Kosovo and Kombinat Trepca (paragraph 6.07);

(c) conclusion of a contract between ILE and Kombinat Kosovo for the construction of the transmission line, operation of the hydroelectric plant and purchase of Gazivode power (paragraphs 3.20 and 3.39);

(d) conclusion of a loan agreement between ILE and Banka Kosova for the provision of all local funds necessary to complete the project, including possible cost overruns (paragraph 6.03);

(e) conclusion of a lenders' agreement between the Bank and Banka Kosova (paragraph 6.02);

(f) conclusion of a subsidiary loan agreement between the Federal Covernment and ILE (paragraph 5.01).

April 19, 1971

YUGOSLAVIA

IBAR PROJECT

Description of Proposed Project

1. The Ibar project will utilize the flows of the Ibar River to supply water to industries and communities, to irrigate 30,000 ha and to generate electrical energy at a hydroelectric plant. The principal features of the project are indicated on Map 2, outlined in the attached table and described below.

2. The Gazivode reservoir, which will have a storage volume equivalent to 80% of the mean annual flow of the Ibar, makes possible the abstraction of 92% of this flow (see Annex 5). The reservoir will be created by the construction of Gazivode dam, a large rockfill, clay-core structure with a grout curtain across its foundation. During construction of the dam the river will be diverted through a tunnel in the left abutment, which will be modified at a later stage to serve permanently as a bottom outlet from the reservoir. When the reservoir has been completed it will be possible to release water over the spillway, through the bottom outlet of the dam, or through the water conduit serving the power station.

3. A second, smaller reservoir, a compensation basin, is located 6 km downstream of Gazivode dam. The Pridvorica dam, the concrete and embankment structure which creates the compensation basin, includes the intake structure for the main water supply conduits serving industries, communities and the irrigated areas. This dam will have a spillway to pass floods discharged at Gazivode dam and a bottom outlet to release water to the Ibar River, both for the Preles weir downstream (where Kombinat Trepca has the intake of its industrial water supply) and for compensation water. The Pridvorica spillway is designed for a smaller flood than the Gazivode spillway but can pass the 1 in 1,000 year flood. It is more economical to make repairs to the Pridvorica embankment in the rare event of a larger flood than to increase this spillway capacity.

4. The Gazivode hydroelectric plant, located on the right bank of the Ibar River, includes a water conduit and a powerhouse with 2 x 17 Mw generating units. The capacity of the plant was determined so that the most economic use of the flow available for power generation would be achieved, consistent with the requirements of the Serbian power system. Power will be generated at times of peak demand and the Pridvorica compensation basin will retain the heavy flows discharged at peak hours and release an even flow to the main conduit of the water supply system through the intake structure. The Pridvorica compensation basin and the plant size selected make it possible to utilize the system's maximum water requirements (during the summer irrigation season) for the generation of peak power during a maximum of nine hours per day.

5. The water conduit from the Gazivode reservoir cuts across a bend in the river to the powerhouse and includes sections of concrete-lined tunnel, steel-lined tunnel and steel penstock. Near the downstream end of the power tunnel is the two-stage surge chamber. Intake gates at the upstream end of the tunnel are operated through a vertical shaft situated near the reservoir edge. Control gates are located downstream of the surge chamber at the beginning of the penstock.

6. The hydroelectric plant is to be connected to the existing transmission network by a single circuit 110 kv line approximately 32 km long, which will be constructed by Kombinat Kosovo, the region's major power producer (paragraph 2.17).

7. Water for industries, communities and irrigation is conveyed from the Pridvorica dam through a total of 147 km of main supply conduits. Open trapezoidal concrete-lined canals, the largest of which are some 9 m wide, are used for 80% of this length, but difficult topography necessitates the use of tunnels (20 totalling 15 km), syphons (26 totalling 12 km) and aqueducts (29 totalling 2 km).

8. The project provides irrigation to 30,000 ha; 23,300 ha in the Ibar and Sitnica valleys and 6,700 ha in the Drenicko area. On the basis of topography and soil constraints, and with a view to increase irrigation efficiency, the following irrigation methods would be used:

(a) low-pressure asbestos cement pipes - 20,000 ha (67%);

(b) sprinklers - 7,000 ha (23%) 1/; and

(c) open-lined canals - 3,000 ha (10%).

About 53% of the area would be supplied by pumping and the balance by gravity. All portable equipment for sprinkler irrigation would be supplied by the Project.

9. The Besinje pumping station provides water for some 6,600 ha of the North Kosovo area. The Hamidja pumping station serves 6,700 ha in the Drenicko area.

10. In the low-pressure pipe and open canal systems, tertiaries with hydrants or outlets would bring water to unit areas of 4 ha. Throughout the system field channels and drains (approximately 50 m per ha, requiring 8 man-days) would be constructed by the farmers with technical assistance from ILE's staff. These very small costs are not included in the project.

11. Land levelling would be carried out in about 5,000 ha in area served by low-pressure pipe and canal systems.

1/ Through portable diesel pumps in Ibar valley (2,000 ha) and by gravity in North Kosovo (5,000 ha).

12. A surface drainage system spaced at 200-400 m intervals would remove excess rain and irrigation water from the irrigated area. About 3,500 ha of low-lying land along the Sitnica River would be reclaimed by intensive field drainage with deep open channels and buried tile drains (2,000 ha). Twelve small pumping stations (100-400 1/sec) would be required. Development of this area would depend on the findings of the drainage study to be carried out under the project (paragraph 3.26). The Sitnica River would be used as the main drainage collector and would be regulated between levees to prevent flooding of the irrigated area. About 17.5 km of levees have already been constructed, mainly to protect industrial centers. The Provincial Government will construct about 30 km of additional levees to protect low-lying agricultural lands following further studies to define the amount of protection which is justified (paragraph 3.19). Interception drainage channels (124 km) along the perimeter of the project area will protect it from external run-off.

13. Roads included in the project are as follows:

(a) reconstruction of 42 km of existing gravel surface village roads;

(b) construction of about 49 km of new gravel surface village roads; and

(c) construction of about 633 km of earth surface roads along irrigation canals and drains, for use as maintenance roads and farm roads.

The detailed design of the road system will take into account the detailed design of the irrigation networks and the existing roads in the area.

14. Erosion control and soil conservation works are designed to minimize erosion and sediment production in the watersheds in the project area and to protect the main conduits against floods. Hydraulic structures on torrential streams will be built as part of the project by ILE. The Provincial Government will be responsible for afforestation and terracing in the catchment areas to retard runoff and reduce erosion (paragraph 3.18).

15. A telecommunication system will connect the watchmen's lodges located on major works and control structures to the field offices and the head office of ILE in Pristina.

16. During the last three years of the construction period, the project would finance 90 man-months of training, locally and abroad, of fifteen professionals of ILE in the fields of operation and maintenance of irrigation systems (6), drainage (1), irrigated agriculture (6), and farm economics (2).

17. The purchase of equipment for operation and maintenance of the facilities after completion of construction is included in the project.

TABLE 1

DATA FOR PRINCIPAL COMPONENTS OF IBAR PROJECT

Gazivode Dam and Reservoir

Type of dam	Rockfill with clay core
Maximum height of dam	107.5 m
Crest length of dam	520 m
Volume of dam	5 million m^3
Depth of grout curtain: left bank	60 m
right bank	100 m
Diversion tunnel: diameter	5.8 m
length	663 m
Reservoir storage: gross	370 million m^3
live	350 million m^3
dead	20 million m^3
Reservoir range	67.7 m
Estimated annual deposit of sediment	0.3 million m^3
Spillway:	
Design flood frequency	0.01% (1 in 10,000 years)
Inflow design flow flood	1,500 m^3/sec
Maximum spillway discharge	1,210 m^3/sec
Type	Ski-jump
Crest length	80 m
Number of flap gates	4
Length of chute	311 m.

Pridvorica Dam and Compensation Basin

Type of dam	Concrete with earth abutment
Maximum height of dam	10 m
Crest length of dam	330 m
Volume of dam: concrete	15,000 m^3
earth	72,000 m^3
Reservoir live storage	0.435 million m^3
Reservoir range	2 m
Spillway: Design capacity	900 m^3/sec
Crest length	33 m
Number of radial gates	3
Bottom outlet capacity	2.0 m^3/sec
Intake structure capacity (for main water supply conduit)	22.2 m^3/sec

Gazivode Hydroelectric Plant

Installed capacity	2 x 17 Mw
Average annual generation	95 Gwh
Type of turbines	Francis, 300 rpm
Range of gross head	50 to 116 m
Net head	111 m
Maximum total flow	36 m^3/sec

Table 1 (continued)

Water conduit from reservoir to powerhouse:		
Concrete-lined tunnel:	length	810 m
	diameter	4 m
Two-stage surge chamber:	height	90 m
	diameter	7 m
Steel-lined tunnel:	length	120 m
	diameter	3 m
Steel penstock:	length	40 m
	diameter	3 m

Main Water Supply Conduits

Total length		147 km
Trapezoidal concrete-lined channels:		
	maximum width	9 m
	total length	118 km
Tunnels:	number	20
	total length	15 km
Syphons:	number	26
	total length	12 km
Flumes:	number	29
	total length	2 km

Pumping Stations

Besinje:	Required capacity	3.4 m^3/sec
	Number of pumps	3
	Type of pumps	horizontal centrifugal, electrically driven
	Total pumping head	66 m
Hamidja:	Required capacity	3.5 m^3/sec
	Number of pumps	3
	Type of pumps	horizontal centrifugal, electrically driven
	Total pumping head	86 m

April 8, 1971

IBAR PROJECT

COST ESTIMATE OF PROPOSED PROJECT [1]

	Local Costs						Foreign Costs						TOTAL	
	1971	1972	1973	1974	1975	Sub-Total	1971	1972	1973	1974	1975	Sub-Total	Million Din	Million US$
	in Million Dinars						in Million Dinars							
1. Gazivode Dam	4.3	36.3	46.8	50.2	38.1	175.7	2.9	20.0	31.1	33.5	25.4	112.9	288.6	19.2
2. Hydroelectric Plant	-	-	9.8	17.9	8.8	36.5	-	-	6.6	12.0	5.9	24.5	61.0	4.1
3. Pridvorica Dam	-	4.8	5.5	-	-	10.3	-	4.2	3.6	-	-	7.8	18.1	1.2
4. Multipurpose Conduits	-	29.6	62.2	51.2	10.1	153.1	-	13.7	18.3	16.9	4.4	53.3	206.4	13.8
5. Irrigation Conduits	-	-	19.8	31.9	26.7	78.4	-	-	5.8	10.6	11.6	28.0	106.4	7.1
6. Pump Stations	-	-	-	4.0	6.0	10.0	-	-	-	1.7	2.6	4.3	14.3	0.9
7. Irrigation Networks	-	-	20.6	33.5	39.2	93.3	-	-	5.2	8.4	9.7	23.3	116.6	7.8
8. Drainage Networks	-	-	1.6	13.2	17.5	32.3	-	-	0.2	1.5	1.9	3.6	35.9	2.4
9. Feeder Roads [2]	-	0.5	4.2	4.5	5.2	14.4	-	0.2	1.1	0.8	1.5	3.6	18.0	1.2
10. Land Levelling	-	-	-	2.4	3.6	6.0	-	-	-	0.6	1.0	1.6	7.6	0.5
11. Tile Drainage	-	-	-	-	1.5	1.5	-	-	-	-	-	-	1.5	0.1
12. Erosion Control	-	4.0	4.0	4.1	4.1	16.2	-	0.3	0.3	0.2	0.2	1.0	17.2	1.1
13. Telecommunications	-	0.1	0.2	-	-	0.3	-	0.4	0.2	-	-	0.6	0.9	0.1
14. Operation & Maintenance Equipment	-	-	-	-	3.1	3.1	-	-	-	-	2.5	2.5	5.6	0.4
15. Land	3.4	5.7	4.6	2.7	-	16.4	-	-	-	-	-	-	16.4	1.1
16. Training	-	-	0.3	0.3	0.2	0.8	-	-	0.2	0.2	0.3	0.7	1.5	0.1
17. Engineering	8.1	8.5	8.8	8.8	9.0	43.2	-	0.2	0.3	0.3	-	0.8	44.0	2.9
18. Offices and Equipment	0.8	0.3	-	-	-	1.1	-	-	-	-	-	-	1.1	0.1
19. Administration	1.2	2.0	2.0	2.0	2.0	9.2	-	-	-	-	-	-	9.2	0.6
Sub-Total	17.8	91.8	190.4	226.7	175.1	701.8	2.9	39.0	72.9	86.7	67.0	268.5	970.3	64.7
Physical Contingencies	2.3	15.4	31.1	37.1	28.8	114.7	0.1	3.8	7.0	8.2	6.4	25.5	140.2	9.3
Price Increases	0.6	14.5	49.3	85.4	88.7	238.5	0.1	3.1	10.6	18.2	19.0	51.0	289.5	19.3
Total	20.7	121.7	270.8	349.2	292.6	1,055.0	3.1	45.9	90.5	113.1	92.4	345.0	1,400.0	93.3

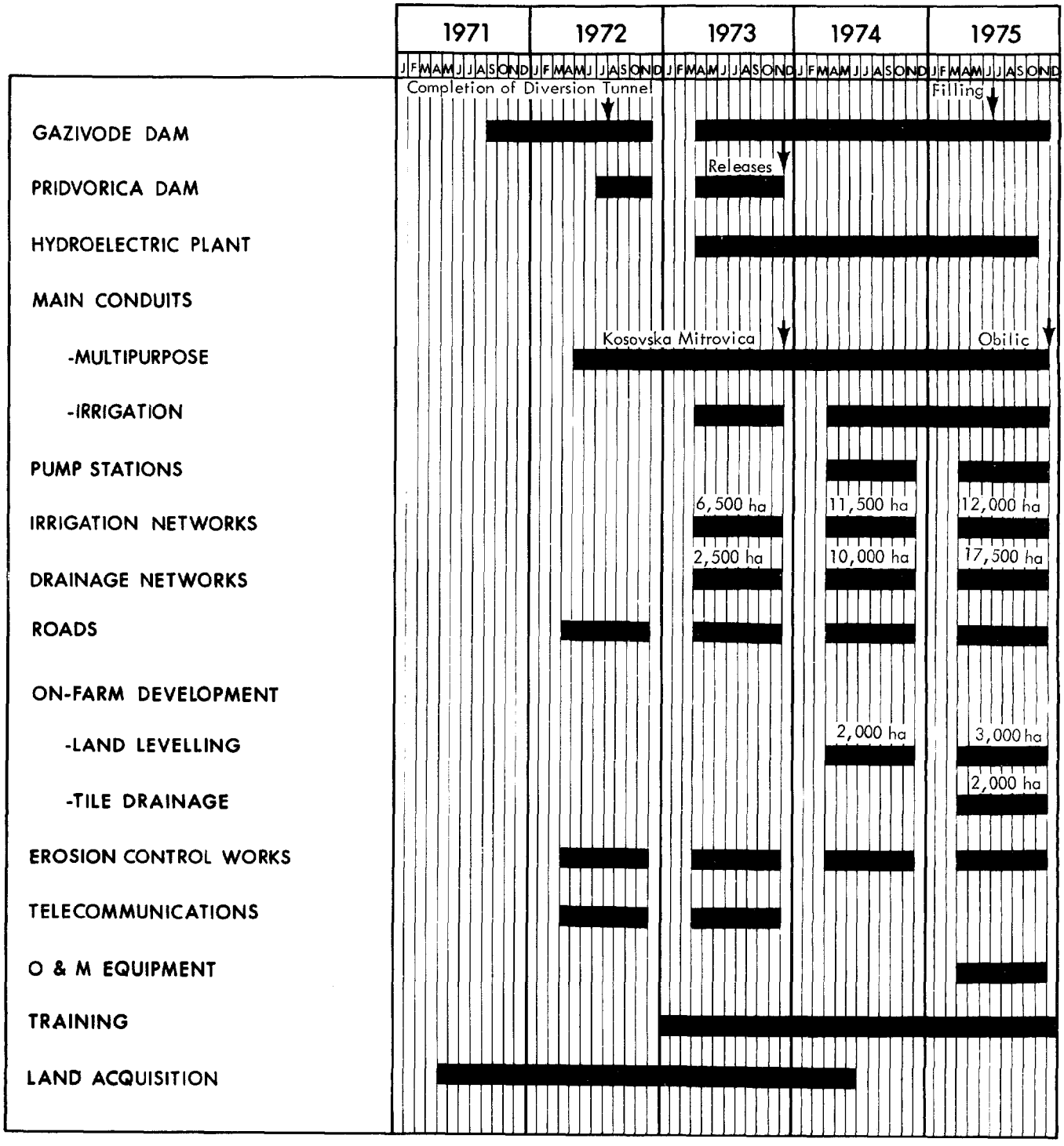
ANNEX 2

1/ This estimate includes only the work for which ILE is responsible.

2/ Costs of irrigation canals and drains include adjacent earth surface roads.

March 10, 1971

IBAR PROJECT
CONSTRUCTION SCHEDULE



IBRD - 5316(2R)

YUGOSLAVIA

IBAR MULTIPURPOSE PROJECT

Estimated Schedule of Disbursements

1. The following table shows the estimated undisbursed amount of the proposed loan at the end of each quarter:

IBRD Fiscal Year and Quarter	Cumulative Disbursement at end of Quarter (Million US$)
1971/72	
December 31, 1971	0.3
March 31, 1972	0.5
June 30, 1972	1.0
1972/73	
September 30, 1972	2.3
December 31, 1972	3.9
March 31, 1973	5.2
June 30, 1973	6.1
1973/74	
September 30, 1973	8.7
December 31, 1973	13.0
March 31, 1974	15.6
June 30, 1974	17.1
1974/75	
September 30, 1974	20.4
December 31, 1974	26.2
March 31, 1975	29.6
June 30, 1975	31.4
1975/76	
September 30, 1975	35.2
December 31, 1975	41.5
March 31, 1976	42.7
June 30, 1976	45.0

2. This schedule is based on the following assumptions:

(a) loan for US$45 million equivalent becomes effective in May 1971;

(b) interest rate 7-1/4% and grace period 6 years;

(c) construction of project commences in 1971 and completion of construction at end of 1975; and

(d) disbursement against the actual foreign exchange cost of imported equipment and of training and engineering services and as a standard percentage of all other contracts.

April 8, 1971

YUGOSLAVIA

IBAR PROJECT

Water Availability and Utilization

1. The Ibar River has a catchment area of 1,060 km^2 above the Gazivode damsite. A river gauging station has been operated at Ribaric, 23 km upstream of Gazivode, since 1924 (with the exception of the period 1940-45), and at the Gazivode site for three years (1960-63). Runoff data at Gazivode has been computed for the 38-year period of record. The mean annual runoff is 13.65 m^3/sec (430 million m^3/year).

2. The Gazivode reservoir's live storage volume of 350 million m^3 would be large enough to regulate the natural river flows with limited spilling so that most of the Ibar River's water could be utilized by the project. The estimated supply capacity of the project would be as follows:

	Million m^3/year	%
Industry (8.8 m^3/sec continous)	278	73.3
Irrigation (30,000 ha)	95 /1	25.1
Communities (0.2 m^3/sec continuous)	6	1.6
Total Utilization	379	100.0

Including an overall allowance of 5% for conveyance losses the average annual abstraction from the Gazivode reservoir would be about 398 million m^3 or 92% of the mean annual runoff.

3. During extreme low flow conditions, 100% of these demands for water could not be met continuously. The project is intended to give priority of supply to domestic and industrial consumers. A reservoir simulation over a 21-year period of record (1947-1968), using preliminary operating rules, indicated that an acceptable supply of water for the irrigation of 30,000 ha could have been provided in 20 out of 21 years (with a 43% shortage in one year). In the same period industrial water shortages of up to 40% of requirements occurred in a total of seven months (2.8% of the time). Such shortages would be unlikely during the first 10 years of the project operation as water demand would not reach the supply capacity of the project until approximately 1985.

/1 The total irrigation demand of 105 million m^3/year referred to in Annex 7 includes conveyance losses.

4. Further study of reservoir operating rules is required, both to assist in project operation and to better define the maximum quantity available for industrial consumption (and the associated reliability of this supply) while assuring an acceptable supply of water for domestic consumers and for the irrigation of 30,000 ha. A slight change in the maximum volume which can be supplied regularly to industry would result if the required reliability of this supply differed from that assumed in the preliminary studies. Alternatively an independent source, such as the existing Batlava reservoir, could be reserved to compensate for minor deficiencies in the water supplied from the Ibar project. These possible variations would not significantly affect the benefits assumed to result from the Ibar project.

5. Whereas the projected water consumption of industry and communities would be relatively constant throughout each year, irrigation requirements are restricted to the summer months, generally from May to September, and would vary from year to year depending on the actual precipitation. After industrial water demand reaches the project's supply capacity, operation of the Gazivode reservoir would release water in accordance with downstream requirements so that more power could be produced in summer than in winter. In the early years of project operation, when spare capacity exists, releases of excess water could be timed to suit requirements of the power system.

April 2, 1971

YUGOSLAVIA

IBAR PROJECT

Industrial and Domestic Water Supply
Sector in Kosovo Province

A. Present Situation

1. Responsibility for water supplies rests with the local authorities: there is no central water resources agency. As these local authorities do not have the resources to design and construct systems, this work is generally done by consultants and contractors. Operation of water supplies at the local level is poor.

2. Each of the nine main towns in the Province -- Pristina, Kosovska Mitrovica, Pec, Prizren, Djakovica, Urosevac, Gnjilane, Vuciturn and Orahovac -- has a central water supply system (see Map 1). As the population of all nine towns does not exceed 300,000 and as the percentage of local population supplied from each central system varies from 20% to 60%, only about 10% of the 1.2 million total population of the Province is supplied from public systems. In all the towns except Pristina, the water supplied from the public systems is regarded by the local Health Institute as unsafe. Private supplies are an even greater source of waterborne infection.

3. People not served by the central water supply systems obtain their water from springs, streams and private shallow wells. Most of these sources are polluted (out of 664 private wells investigated by health officials during 1964-67, 558 were found to be contaminated).

4. Industries obtain their water supplies from the particular town's central system (if available or adequate) or from their own system, depending on the quantity and quality of water required.

5. Typhoid fever, bacillary dysentery and infectious hepatitis are endemic in the region and epidemics are frequent; the water supply systems have been found to be the principal source of infection. It is significant to note that a few years ago, when WHO was testing the effects of typhoid vaccination, Kosovo Province was selected from among several areas of the world as the most suitable for the studies, largely because of the consistently high rate of typhoid and frequency of epidemics in the area.

6. Since the method of financing and operating each independent system varies, the water supplies of towns and industries in the vicinity of the Ibar project are described individually below. The various towns and facilities are shown on Maps 1 and 2.

Pristina (population 65,000)

7. A dam and impounding reservoir were built on the Gracanka River (tributary to the Sitnica River) in 1965-66 to supply this provincial capital. The reservoir has a capacity of 24,000,000 m^3, which can supply an estimated 0.78 m^3/sec continuously. Treated water is supplied to other nearby centers, such as the industrial center of Obilic. The authorities estimate that some 70,000 people are supplied from this system.

8. Present treatment consists of aeration, pre-chlorination, coagulation, sedimentation, rapid sand filtration and post-chlorination at a treatment plant on a hill above the reservoir.

9. In addition to the treated water supplied from the Gracanka dam, untreated water is supplied both to industry (flotation of lead/zinc ore) and agriculture (irrigation of some 2,260 ha, as shown on Map 1). Except for a long-term commitment to provide 0.075 m^3/sec for the mining industry, which participated in financing the Gracanka dam, supplies to agriculture and industry will be cut off as the demand for water for domestic purposes grows. The Ibar project is expected to replace the Gracanka source for these low priority consumers.

10. Domestic water is supplied by approximately 5,000 metered private connections and 24 public water points. Domestic consumers pay a subsidized rate of Din 0.80/m^3 for treated water. Public institutions pay Din 1.20/m^3 and industry Din 2.00/m^3m. Untreated water is sold to the lead/zinc industry at a contract rate of Din 0.21/m^3. The water supply seems to be in financial difficulty and in need of a rate increase which would have to be approved by the commune.

Kosovska Mitrovica (population 41,000)

11. This town's central supply system obtains water from shallow wells and filtration galleries on the left bank of the Ibar River. The supply is inadequate and shortages are frequent, particularly in the summer. The only treatment is disinfection by chlorination. Water is sold on a metered basis at Din 0.75/m^3 for domestic use and Din 1.85/m^3 for industry. Water from the system has recently been implicated in an epidemic of infectious hepatitis.

12. Consultants (Energoprojekt of Belgrade) are presently designing an augmentation to the existing water supply for the town. In the initial phase water will be pumped from the Ibar but after completion of the Ibar project, the source will be the proposed main conduit from the Pridvorica dam.

13. Kombinat Trepca, operating the lead/zinc industry, has its own water supplies in this area. At the Preles weir on the Ibar River is a simple sedimentation tank from which water flows to the industry through 14 km of concrete-lined canals, syphons and tunnels. The conduit has a nominal

capacity of 1.100 m^3/sec but water delivery is limited to about 0.960 m^3/sec by leakage in the system. This Kombinat also pumps water from the Ibar and Sitnica Rivers in the town area to augment its supply of untreated water.

Obilic (population 5,000)

14. In this industrial complex, Kombinat Kosovo operates its own water supply to provide for the various industrial water requirements. Water is pumped from the Lab River and treated in pressure filters at Prugovac. It is then pumped some 10 km to Obilic. To augment low flows in the Lab River, the Batlava dam was built on an upstream tributary. This dam, with a storage volume of 36,000,000 m^3, was initially built to irrigate some 9,000 ha in the Little Kosovo area of the Lab valley, but when the industrial requirements at Obilic increased, the irrigation scheme was deferred. Batlava dam and the Prugovac pumping station are at present being used exclusively by Kombinat Kosovo. Lack of metering on this supply makes definition of the capacity difficult, but the Kombinat estimates that the dependable capacity of the Batlava scheme is about 1.1 m^3/sec. Under natural conditions, more water is available most of the time.

15. Treated water from the Gracanka scheme is also supplied for domestic requirements at Obilic.

Vuciturn (population 13,000)

16. An old spring intake, private wells and a new well near the Sitnica River provide this town's basic supply, distributed through two public water points. Most of the water is polluted, no treatment is provided, and there are regular shortages. Since phenol is occasionally found in water from the well near the river (due to wastes discharged upstream), this source can be used only irregularly. Waterborne diseases are endemic in the community, with epidemics occurring almost every year.

B. Estimated Water Consumption of Industry and Communities

Industries

17. Records are not available on past trends in water consumption of the industries in the project area. No water meters are installed, hence estimates of present consumption cannot be verified.

18. Future water consumption is based on the planned expansion of industrial output. Water for industry is required at two principal locations in the project area -- Kosovska Mitrovica and Obilic. In each location, a single enterprise requires the greatest portion of the water and is prepared to sign long-term purchase contracts with ILE for its supply. Kombinat Trepca is at Kosovska Mitrovica and Kombinat Kosovo at Obilic. In addition to the water requirements of these two main enterprises, there are a number of smaller industrial consumers in each location whose estimated future demand is only a small proportion of that of the two Kombinats.

19. The estimated industrial water consumption for the two areas, prepared by the consultants, is as follows:

Estimated Annual Consumption in million m^3

	---Kosovska Mitrovica---			----------Obilic---------			
Year	Kombinat Trepca	Other	Sub-Total	Kombinat Kosovo	Other	Sub-Total	TOTAL
1970	49.2	-	49.2	38.0	3.4	41.4	90.6
1975	77.2	3.9	81.1	78.4	3.4	81.8	162.9
1980	78.2	3.9	82.1	127.0	3.3	130.4	212.5
1985	83.5	6.1	89.6	176.1	12.6	188.7	278.3

20. These volumes are estimated to be required at a continuous rate, with little seasonal variation (about 10%), as the industrial processes which are to be supplied will operate continuously.

21. Kombinat Trepca plans to use most of the water for the lead/zinc industry (in flotation, smelting and refinery operations and the production of lead batteries and superphosphate fertilizer). Officials estimate that very little of this water will be recirculated as it would be uneconomic to reclaim it.

22. In the Obilic complex, most industry is related to exploitation of the abundant lignite reserves in the area. In 1970, for example, 79% of the estimated consumption was for cooling water for the 590 Mw thermal electric generating plant. In 1985, Kombinat Kosovo expects to have some 2,400 Mw installed at Obilic; almost 50% of their water consumption would then be for power plant cooling. All cooling water used now and in the future is to be recirculated. The water is needed to make up losses. Other planned industrial processes at Obilic include coal-drying and gasification (now in operation) and production of nitrogeneous fertilizers, caprolactam, sulphuric acid and nickel. Recirculation of most water is planned.

23. The necessary margin of error in these estimates should be taken into account. They are based on consumption that is not metered and are projections for 15 years, to more than 300% of present requirements, on the basis of planned industrial expansion. Changes in markets or technology could cause significant changes in associated water consumption.

Communities

24. The estimated population in the Ibar project area, excluding the town of Pristina (which has its own adequate water supply), is presently 200,000. Kosovska Mitrovica, the largest town to be served by the Ibar project, has a population currently estimated at 41,000. Annual net population increase in Kosovo Province is estimated at 2.85%.

25. Estimates of water the Ibar project will provide to communities in the area have been provided by the consultants as follows:

Year	1976	1979	1982	1985
Consumption (million m^3)	2.9	4.0	5.0	6.1

26. Assuming that the population grows at 2.85% annually and that about 50% of the people in the project area are provided with water by the project in 1985, this would be equivalent to a per capita daily consumption of about 110 liters, a reasonable figure. Until the engineering studies referred to in paragraph 3.29 are completed, it is not possible to provide more accurate estimates of the future domestic water consumption. As the 1985 estimate represents only 1.5% of the total water utilization under the project, it is apparent that a 100% change in the estimate would have little impact on the rest of the project.

April 8, 1971

YUGOSLAVIA

IBAR PROJECT

Water Supply for Agriculture

1. The irrigation water requirements for the project were calculated using the Blaney-Criddle method 1/, and are as follows:

Crop	Irrigation Requirements per season, in mm	
	Field	Diversion
Wheat	35	39
Barley, spring	110	122
Sugar beet	376	418
Sunflower	160	178
Maize (grain)	279	310
Maize (fodder)	273	303
Vetch, Rye	45	50
Alfalfa	480	533
Vegetables	450	500

The 80% change effective rainfall has been deducted and a field efficiency of 75% and conveyance losses of 10% have been taken into account, giving an overall efficiency of 67.5%. These levels have been adopted in view of the all-lined conveyance and distribution system and the extent of the low-pressure pipe (67%) and sprinkler networks (23%).

2. The calculations for the four main crops -- sugar beet, maize (grain), maize (fodder) and alfalfa -- are presented in Table 1. These water requirements were checked with actual practice in the Gracanka sprinkler system (2,000 ha) in the vicinity of the project, and the Prizren network (5,600 ha) in the Metohija plain.

3. The estimated seasonal irrigation demand below reservoir would be 105 million m^3 2/, or 3,500 m^3 per ha. Peak monthly demand of 35.7 million m^3 would occur in July (see Table 2) and the continuous discharge to meet this requirement is 0.45 l/sec/ha. The short period peak demand without taking into account rainfall is estimated at 0.513 l/sec/ha/or a total demand at the Pridvorica dam of 15.4 m^3/sec.

1/ With the modifications of the Soil Conservation Service (United States Department of Agriculture) Technical Release No. 21, April 1967.

2/ The net irrigation demand of 95 million m^3/year referred to in Annex 5 excludes the assumed conveyance losses from the reservoir to the field turnout.

4. Design capacities proposed by the consultants for all major conduits, pumping stations and structures would be adequate to accommodate this maximum flow.

5. Data on the quality of the Ibar water indicate that the soluble salt content is very low (less than 370 mg/l) and that bicarbonate ion is dominant. The water is suitable for continuous irrigation with practically no salinity or sodium hazard.

6. On the basis of sediment measurements, it was found that the annual loss of the reservoir storage space would be in the order of 0.3 million m^3. This corresponds to less than one part per thousand of the total capacity, and is acceptable for the life expectancy of the project.

TABLE 1: Seasonal Irrigation Requirements by Main Crops at Pristina, (Latitude 42°41' North)

	Sugar beet	Maize (grain)	Maize (fodder)	Alfalfa
	----------in millimeters----------			
Average season, consumptive use	484	408	264	638
Average rainfall	195	195	105	280
Effective rainfall	144	129	71	198
Carry-over soil moisture	90	90	-	120
Average net irrigation requirements	250	189	193	320
Average gross irrigation requirements:				
Field (E = 75%)	333	252	257	427
Diversion (E = 90%)	370	280	286	474
Calculations based on 80% Chance Rainfall, adopted for Ibar Project				
80% chance rainfall	151	151	79	217
Effective rainfall	112	109	59	158
Carry-over soil moisture	90	90	-	120
20% chance net irrigation requirements	282	209	205	360
20% chance gross irrigation requirements:				
Field (E = 75%)	376	279	273	480
Diversion (E = 90%)	418	310	303	533

TABLE 2: Estimated Water Requirements for Agriculture

	Area (ha net)	Gross Irrigation Requirements[1] (in m3/ha) May	June	July	Aug.	Sept.	Total	Monthly Diversion Irrigation Demand (in million m3) May	June	July	Aug.	Sept.	Total
Wheat	11,400	390	-	-	-	-	390	4.5	-	-	-	-	4.5
Barley	400	390	830	-	-	-	1,220	0.1	0.4	-	-	-	0.5
Sugar beet	2,900	-	1,430	1,890	860	-	4,180	-	4.0	5.4	2.5	-	11.9
Sunflower	1,100	-	1,000	780	-	-	1,780	-	1.1	0.9	-	-	2.0
Maize (grain)	8,500	-	690	1,610	800	-	3,100	-	5.9	13.7	6.8	-	26.4
Maize (fodder)	8,500	-	-	640	1,640	750	3,030	-	-	5.5	13.9	6.4	25.8
Vetch Rye	3,000	-	-	-	-	500	500	-	-	-	-	1.5	1.5
Alfalfa	3,300	270	1,510	1,690	1,700	160	5,330	0.9	5.0	5.6	5.6	0.5	17.6
Vegetables	2,500	440	1,240	1,840	1,800	600	5,920	1.1	3.1	4.6	4.5	1.5	14.8
Monthly Totals	(41,600)							6.6	19.5	35.7	33.3	9.9	105.0

1/ Based on monthly estimates derived by Blaney-Cridle method (80% chance effective rainfall), field efficiency 75%, conveyance losses 10%.

December 18, 1970

YUGOSLAVIA

IBAR PROJECT

Agriculture in the Project Area

A. General

Location

1. The project area, extending over 35,000 ha gross, is in the northern part of the Kosovo plain (see Map 1) and consists of:

(a) the Ibarsko Polje, 3,000 ha, a narrow valley along the upper Ibar River;

(b) the North Kosovo Polje, 24,000 ha, the northern part of the Kosovo plain drained by the Sitnica River; and

(c) the Drenicko Polje, 8,000 ha, a high plateau located about 8 km southwest of the North Kosovo plain and drained by the Drenica River, a tributary of the Sitnica.

Climate

2. The Kosovo plain has an intermediate type of climate, between the continental and the arid, with an average yearly temperature of 10°C and precipitation of 580 mm. The winters are long and cold, lasting from mid-November until March, with a minimum temperature in January of -20°C. Half the winter precipitation of about 220 mm falls as snow, which covers the land for long periods. Spring is usually short (April - May) and is followed by a hot summer lasting until mid-September, with temperatures reaching 35°C in July and August. Autumn is also short -- mid-September to mid-November. Rainfall is distributed evenly throughout the growing season (40 - 50 mm per month), but is insufficient in most years to meet the water requirements of summer crops. Average precipitation during the summer is 250 mm 1/, as against roughly twice as much potential evapotranspiration. Evaporation totals about 400 mm. Relative humidity ranges from an average 90% in winter to 60% in summer.

Soils, Topography and Drainage

3. In 1961-1965, consultants made a reconnaissance soil survey of the project area, at an average density of three auger holes per 100 ha and a depth of 2m. For the main soil types, field measurements of water infiltra-

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1/ It was less than 185 mm for two years out of 10 during the period of record.

tion with cylinders and permeability tests by the auger hole method have also been carried out. Samples taken at 60 cm intervals or at change of profile were analyzed at the J. Cerni Institute for particle size distribution, $CaCO_3$, pH, conductivity, exchangeable hydrogen, porosity and field capacity.

4. Three soil groupings were identified, corresponding roughly to classes 2s, 3st and 3sd of the U. S. Bureau of Reclamation (USBR) classification. (Class 2s covers 63% of the project area and comprises deep soils with moderately heavy to heavy texture (clay loams and clays). Soil reaction is moderately acid; permeability is moderate. With fertilizers and irrigation, these soils would be highly productive. Class 3st covers 25% of the project area and includes soils with a lighter texture (loam and clay loams), rolling topography with slopes up to 5% and good permeability. Class 3sd covers 12% of the project area and consists of the low-lying lands along the Sitnica River, with heavy texture, flat topography and restricted internal drainage. A detailed land classification of the entire project area (1:2,500, using United States Bureau of Reclamation land classification specification) is to be completed by 1971 (paragraph 3.25).

5. Nearly 60% of the area has slopes of between 0.5% and 2%, and about 5,000 ha of these lands would require land leveling. In the southeastern part of the North Kosovo Polje, about 7,000 ha with an undulating surface and slopes of up to 5% could not be leveled economically and would therefore be served by sprinkler irrigation.

6. The groundwater underlying the area is fresh, and the water table is at a depth of more than 7 m throughout much of the area. The prevalence of heavy textured soils of low permeability, however, would require construction of a drainage system to remove excess rain and irrigation water. Some 10,000 ha of project lands (mostly in meadows), which are presently subjected to floods from the Sitnica and Lab Rivers, would be protected from floods by levees to be constructed by the Province (see paragraph 3.19). Intensive drainage with deep open channels and 12 small drainage pumping stations would be required along the Sitnica River where black meadow soils cover some 3,500 ha; about 2,000 ha in this area would also require tile drainage. Additional investigations of drainage requirements on these 3,500 ha would be carried out under the project (paragraph 3.26) to determine the economic viability of irrigation in this area.

Land Holdings

7. Agricultural production in the area is carried out by private farmers, cultivating about 78% of the land, and by large enterprises in the social sector -- an agro-industrial enterprise (Kombinat Kosmet-Export) and six Production Cooperatives. All private farms in the area are owner-operated, with their size limited under a strictly enforced law to 10 ha of arable land. The average size of private holdings is small, as shown below:

Size of Holdings (ha)	Number of Holdings (No.)	(%)	Area (ha)	(%)
Up to 2	8,200	69	10,000	38
2 to 5	2,200	19	7,400	27
5 to 8	1,100	9	6,600	24
8 to 10	300	3	3,000	11
	11,800	100	27,500	100

8. Besides being small, farm holdings in the area are fragmented. While the problem is not serious enough to affect the project's economic viability, consolidation of holdings would accelerate the introduction of mechanization. As about 90% of the irrigation network consists of either buried pipes or sprinklers, the system would not cause further fragmentation in the area, but some reorganization of farm holdings would be required by the irrigation and drainage ditches in the project. Existing laws permit the Provincial Government to introduce land consolidation where it can get the concurrence of two-thirds of the farmers, but to date there has been no attempt to consolidate holdings. Under the project the Provincial Government would introduce a land consolidation program in the irrigated area or at least adjustment of property boundaries, prior to construction of the irrigation and drainage networks paragraph 3.24).

Factories and Service Cooperatives

9. Kombinat Kosmet-Export has some 1,800 employees and owns about 17,000 ha, of which 12,000 ha are in the Ibar-Lepanac system including about 4,100 ha in the project area. The Kombinat owns and operates a dairy factory (22,000 l/day), a slaughterhouse with cold storage facilities (5,000 ton), a feed mill (30,000 ton/year), an oil mill for processing sunflower seed (12,000 ton), and a sugar factory (15,000 tons of sugar per year). About two-thirds of the produce being processed in purchased under contract from private farms and Production Cooperatives; the balance is produced on the Kombinat's land. Most of the processing facilities are under-utilized at present. The Kombinat also owns livestock and exports lamb, pork and baby beef, mainly to Italy and Greece.

10. Through its service cooperatives, the Kombinat provides private farmers with farm inputs, machinery services and technical assistance. Inputs are provided in kind and are interest-free if the loan is repaid on time. Farmers have no say in the management of the Kombinat's own agricultural land or of its industrial and other assets. Membership in the service co-operatives fluctuates from year to year but it usually covers only about one-quarter of the lands under private ownership. The remaining farmers do not use purchased farm inputs and are not receiving extension services.

Agricultural Production

11. At present, cereals are the most important crop, accounting for nearly 80% of the cultivated land. Sugar beet, sunflower and alfalfa are also produced, mainly in the social sector, while in the private sector farmers grow vegetables under partial irrigation using the traditional waterwheels or by pumping from the river. The use of farm machinery, fertilizers and other purchased inputs is limited mostly to the social sector, where yields are above average. Traditional farming techniques resulting in low yields are practiced in most of the private farms. Details on the present cropping pattern are given in the attached Table 1. The bulk of the produce from the social sector is marketed, while produce from the private sector is mainly consumed on the farms.

12. Livestock production is presently limited to the hill pastures, complemented by grassland areas in the plain. A limited amount of beef fattening takes place during the summer in the social sector, while on the small holdings poultry production is popular. Details on livestock in the area are given in the attached Table 3.

B. Agricultural Development

Production

13. Irrigation in the project area would permit a greater cropping intensity along with higher yields and a closer integration of crop and livestock production through development of fodder crops. The timing between crops would be tight, particularly in July, and a strict time schedule in planting and harvesting would have to be adhered to. The projected cropping rotation is already being followed by the Kombinat and the Production Cooperatives.

14. The projections of agricultural production shown in Table 2 result from substantial increases in yields due to irrigation, improved varieties, increased utilization of farm inputs and an effective extension service. Yields in the private sector are expected to at least double from their present very low levels. The area under cultivation by the Kombinat is expected to increase as it absorbs all the Production Cooperatives and buys up some of the less productive private farms.

15. Seeds, fertilizers and agricultural chemicals should be available in adequate quantities from existing supply sources for the enterprises of the social sector, and the latter would make them available to the private sector (paragraph 3.35). The Provincial Government will ensure that all farmers in the project area will have access to the necessary credits, farm inputs and machinery services.

16. Fodder production would be an important factor in the area following the introduction of irrigation. For best use of the fodder, livestock development would concentrate on cattle, complemented by intensive pork production. Sheep production would gradually shift to the surrounding hill pastures. Draught animals (oxen and horses) would progressively be replaced by heavy

and light equipment. The local dairy herd in the private sector would be improved by being crossed with pure high-yielding breeds. The authorities have selected the Friesland, Red Danish and Simmenthal breeds as substitutes for the local Bushar breed; the Simmenthal in particular would be used because of its hardy qualities. The social sector's present stock of 1,000 cows would be increased by the purchase of 5,000 pure bred cows.

17. The objective in milk production is to obtain 13,000 cows (6,000 in the social sector and 7,000 in the private sector), with a computed average yield of 3,000 liters per cow per year at full development.

18. Pig production utilizing grain maize would be on an industrial basis and confined to the social sector. There is already an intensive pig production (10,000 head per year); it is expected to reach 40,000 head per year. Poultry and other farm animals would also continue to be produced by small farmers, and their production could easily double.

19. Most of the marketing operations in the area are handled by the Kombinat and Production Cooperatives. In addition, a Federal purchasing agency buys wheat when prices fall below the established floor. Private farms also sell their surplus vegetable produce in the markets of the urban centers, where sales are limited to consumers and no middlemen are allowed. Prices in these municipal markets are determined by factors of supply and demand.

20. Yugoslavia has support prices for wheat, sugar beets, sunflower seed, tobacco and milk. Milk prices include a Federal premium of Din 0.30 per liter as an incentive to increase production. Although meat prices are fixed at the retail level by each municipality, they are relatively attractive to the producers since there is no middlemen's margin in the marketing. A new fund to promote meat production has been created by the Association of Livestock-producing Enterprises. The Association enters into export contracts with foreign buyers.

Market Prospects

21. The main produce to be marketed under the project would be sugar beets, sunflower seed, wheat, vegetables, beef, pork and milk. All the maize and fodder production would be consumed in the area by the livestock industry. With the present 1.2 million population in Kosovo Province, its annual population growth rate of 2.8%, the continuous migration from rural to urban areas and the overall deficit in foodstuffs, there should be no difficulty in marketing the project's surplus produce at the projected price levels. The marketing prospects are described in brief below.

22. Yugoslavia is now importing about 20% of its sugar requirement and the project's output of sugar beets would therefore contribute to import substitution. The projected sugar beet production of 125,000 tons (by comparison, present output in the Province is 86,000 tons) would all be processed by the existing factory at Pec, thereby permitting it to operate

at near full capacity. Similarly, sunflower seed production would permit better utilization of an existing factory in the area. After on-farm wheat consumption (10,000 tons) is deducted, about 32,000 tons would be available for sale each year. Since the Province is deficient in wheat production, it is expected that wheat surpluses from the project would find a ready market. Unlike the other produce listed above, which would be sold through Kombinat, vegetables would be sold by farmers in the markets of major towns in the Province at the projected price levels. There are also good prospects for trucking vegetables to tourist resorts along the South Adriatic coast. About 30,000 tons of vegetables out of a total production of 40,000 tons are expected to reach the market, with no difficulties anticipated in marketing that amount.

23. Significant expansion is expected in the production of milk, beef and pork. Kosovo Province now imports between 5 and 10 million liters of milk annually and milk production is constrained by lack of fodder. The availability of low-cost fodder will make milk production financially attractive. It is expected that milk production will go up from 4 million liters to 40 million liters. Beef production in the project area is expected to increase from the present level of 300 tons (liveweight) annually to 9,300 tons; it would be mainly high quality baby beef (Jugo beef) for export to European Economic Community markets. Pork production is expected to increase from 1,000 tons (liveweight) annually to 4,500 tons; most would be exported outside the Province since two-thirds of the local population are Moslem and do not eat pork.

Farm Income

24. In the evaluation of project benefits for the farms, three typical farm units were examined: (a) private 1.5 ha farm, (b) private 4.5 ha farm, and (c) 500 ha farm in the social sector with intensive dairy production. On the private farms, income was computed without costing management and family labor, whereas in the social sector all labor and management contributions were costed. Because of the high labor requirement, it was assumed that the production of vegetables for commercial sale would be limited to private farms.

25. Full agricultural development is expected in 1983. Net farm income per ha, after deducting an average water charge of Din 1,100 (US$73) and making allowance for family subsistence on the private farms, is projected as follows: Din 2,647 (US$176) on 1.5 ha farms, Din 2,687 (US$179) on 4.5 ha farms, and Din 3,200 (US$213) in the social sector. After allowance is made for farm consumption, water charges represent about 29% of net cash income on both the 1.5 ha farm and the 4.5 ha farm. The corresponding figure in the social sector would be about 26%. Farm budgets for the three typical farm units at full development are presented in Tables 4, 5, and 6.

26. The prices used for the farm budgets and the economic rate of return are those relating to projected prices in the project area in 1979-81. Prices for wheat, maize-grain, maize-fodder, barley and sunflower have been

based on projected world market prices, cif South Adriatic Coast plus transportation cost to the project area. The prices of alfalfa and vetch rye are based on world prices of feed grains expressed in equivalent feed units and adjusted for transportation costs. Sugarbeet production, expressed in sugar equivalent, was priced at cif prices for sugar, U.S. ports. Vegetable, milk and pork production will be fully absorbed by the internal market and current farm-gate prices have been used. In all cases appropriate adjustments have been made to account for the devaluation of the Dinar in January, 1971.

April 8, 1971

TABLE 1

PRESENT NET RETURNS FROM AGRICULTURE

	Cropped Area (ha)	Yield 1/ (ton/ha)	Price (Din/ton)	Gross Value of Production	Production Costs (Din/ha)	Net Value of Production	Net Returns from Project Area
Wheat	8,000	2.2	1,200	2,640	1,250	1,390	11.1
Maize (grain)	8,000	2.0	850	1,700	850	850	6.8
Alfalfa	900	4.0	350	1,400	1,150	250	0.2
Vegetables	1,300	7.5	760	5,700	2,100	3,600	4.7
Sunflower	1,300	1.5	1,450	2,180	950	1,230	1.6
Barley	900	1.6	950	1,520	750	770	0.7
Other	2,600	-	-	1,700	750	950	2.5
TOTAL	23,000						27.6
Income from Livestock							3.8
GRAND TOTAL							31.4

1/ Yields for the main crops represent the weighted average for the social and private sector. Present yields are as follows:

Crop	Social Sector (ton/ha)	Private Sector (ton/ha)
Wheat	3.0	1.6
Maize	3.5	1.8
Alfalfa	4.5	3.3

April 2, 1971

TABLE 2

PROJECTED NET RETURNS AT FULL AGRICULTURAL DEVELOPMENT 1/

	Cropped Area (ha)	Yield (ton/ha)	Price (Din/ton)	Gross Value of Production	Production Costs (Din/ha)	Net Value of Production	Net Returns from Project Area (Din millions)
Wheat - Social	4,400	5.0	1,200	6,000	2,000	4,000	17.6
Private	7,000	3.5	1,200	4,200	1.400	2,800	19.6
	11,400						37.2
Maize Grain - Social	3,300	7.5	850	6,380	2,200	4,180	13.8
Private	5,200	6.0	850	5,100	2,000	3,100	16.1
	8,500						29.9
Maize Fodder (Silage) - Social	3,100	35.0	150	5,250	2,200	3,050	9.5
- Private	5,400	28.0	150	4,200	1,600	2,600	14.0
	8,500						23.5
Alfalfa - Social	1,300	13.5	350	4,720	2,700	2,020	2.6
- Private	2,000	12.0	350	4,200	1,900	2,300	4.6
	3,300						7.2.
Vetch Rye - Social	1,100	30.0	110	3,300	1,500	1,800	2.0
- Private	1,900	25.0	110	2,750	1,200	1,550	2.9
	3,000						4.9
Sugar Beet - Social	800	55.0	160	8,800	3,700	5,100	4.1
- Private	2,100	45.0	160	7,200	3,300	3,900	8.2
	2,900						12.3
Vegetable - Private	2,500	16.0	760	12.160	3,400	8,760	21.9
Sunflower - Social	400	3.4	1,450	4,930	1,500	3,430	1.4
- Private	700	2.8	1,450	4,060	1,100	2,960	2.1
	1,100						3.5
Barley - Social	400	4.3	950	4,080	1,700	2,380	1.0
Total Area	41,600						
Net Return from Crops							141.4
Net Return from Livestock							14.1
Total Net Returns							155.5

1/ Expected to be attained by 1983

April 5 1971

TABLE 3

Present Livestock Population in the Project Area

	Kombinat "Kosmet-Export"	Production Cooperatives	Individual Farms 1/	Total 1/
Cattle:				
Total	950	126	19,100	20,200 2/
Milk cows and heifers	628	76	10,700	11,400
Pigs:				
Total	9,865	160	3,500 3/	13,500
Sows	1,072	18	600	1,700
Sheep:				
Total	-	33	7,200	7,200
Ewes	-	27	5,400	5,400
Horses	-	-	3,700	3,700
Poultry	-	-	44,000	44,000
Buffaloes	-	-	2,900	2,900

1/ Rounded to the nearest hundred.

2/ 1969 data. However, present availability in the Kombinat has increased to 1,000 dairy cows. About 3,500 head are not considered to be fed from the resources of the project area.

3/ These are kept by the non-Moslem farmers.

April 2, 1971

TABLE 4

Farm Budget of Typical Private Farm of 1.5 ha at Full Development

	Area (ha)	Production (tons)	Gross Value of Production (Din)
Crops			
Wheat	0.50	1.7	2,040
Maize (grain)	0.30	1.8	1,530
Sugar beet	0.20	9.0	1,440
Sunflower	0.10	0.3	440
Vegetables	0.35	6.0	4,560
Fodder Crops 1/	0.75	-	-
Total	2.20		10,010
Livestock			
Milk (liters)		3,000	4,500
Meat (kg)		110	990
Total			5,490
Total Gross Value of Production			15,500
Production Costs 2/			
Crops			3,260
Livestock			1,620
Miscellaneous (including Water Fund levy)			1,200
Total			6,080
Net Income before water charge			9,420
Water Charge 3/			1,650
Net Income			7,770
US$ equivalent			518
Net Cash Income after deducting farm consumption 4/			3,970
US$ equivalent			$265

1/ The production of .4 ha of maize fodder, .15 ha of vetch-rye and .2 ha of alfalfa will be consumed by the livestock on the farm.

2/ All labor requirements would be provided by the family and have not been costed.

3/ Water charge based on project-wide average of Din 1,100 per ha.

4/ Farm consumption valued at around Din 3,800 is based on 600 kg of wheat, 500 kg of maize grain, 3 liters of milk per day and the produciton of .1 ha of vegetables.

April 5, 1971

TABLE 5

Farm Budget of Typical Private Farm of 4.5 ha
at Full Development

	Area (ha)	Production (tons)	Gross Value of Production (Din)
Crops			
Wheat	1.7	6.0	7,200
Maize (grain)	1.6	9.6	8,160
Sugar beet	.4	18.0	2,880
Vegetables	.2	3.2	2,430
Fodder Crops 1/	2.5	-	-
Total	6.4		20,670
Livestock			
Milk (liters)		6,000	9,000
Meat (kg)		1,130	10,170
Total			19,170
Total Gross Value of Production			39,840
Production Costs 2/			
Crops			7,580
Livestock			7,620
Miscellaneous (including Water Fund levy)			3,800
Total			19,000
Net Income before water charges			20,840
Water charge 3/			4,950
Net Income			15,890
US$ equivalent			1,059
Net cash income after deducting farm consumption 4/			12,090
US$ equivalent			$ 806

1/ The production of 1.3 ha of fodder maize, 0.5 ha of vetch rye, 0.7 ha of alfalfa and the sugar beet tops would be consumed by the livestock on the farm.
2/ All labor requirements would be provided by the family and have not been costed.
3/ Water charge based on project-wide average of Din 1,100 per ha.
4/ Farm consumption valued at around Din 3,800 is based on 600 kg of wheat, 500 kg of maize grain, 3 liters of milk per day and the production of 0.1 ha of vegetables.

April 5, 1971

TABLE 6

Farm Budget of Typical 500 ha Farm
in the Social Sector at Full Development

	Area (ha)	Production (tons)	Gross Value of Production (Din 000's)
Crops			
Wheat	195	975	1,170
Maize (grain)	150	1,125	956
Sugar beet	45	2,475	396
Sunflower	23	85	123
Barley	17	73	69
Fodder Crops 1/	281	-	-
Other (by-products)	-	-	153
Total	711		2,867
Livestock			
Milk (000's liters)		750	1,125
Meat (tons)		157	1,413
Total			2,538
Total Gross Value of Production			5,405
Production Costs 2/			
Management			240
Crops			950
Livestock			1,220
Sub-total			2,410
Other Costs			115
Loan Repayment			400
Taxes and Duties (including Water Fund levy)			330
Total			3,255
Net Income before water charge			2,150
Water Charge 3/			550
Net Income			1,600
US$ equivalent			$106,667

1/ The production of 148 ha of maize fodder, 63 ha of vetch-rye and 70 ha of alfalfa is consumed by the livestock on the farm.
2/ Including labor.
3/ Water charge based on project-wide average of Din 1,100 per ha.

April 5, 1971

YUGOSLAVIA

IBAR PROJECT

The Power Sector and Use of Gazivode Hydroelectric Plant

Power Sector in Serbia and Kosovo

1. Generation, transmission and distribution of electric power in Yugoslavia are the responsibility of a large number of separate enterprises grouped and coordinated on a regional basis. There are six regional systems in the country, the largest being the system of the Republic of Serbia and Kosovo Province, where the Gazivode plant will be located. The 12 generating enterprises and the enterprise (Elektristok) for high voltage transmission in Serbia and Kosovo are grouped in ZEPS, the Association of Electricity Producers of Serbia. Because one of the region's principal natural resources is large reserves of lignite, Kombinat Kosovo was established to exploit them, both as a fuel and as raw material on which to base related industries. The Kombinat is the electric power producer in Kosovo Province which sells its generation to ZEPS under a long term contract. It is also the enterprise responsible for the industrial complex at Obilic, which includes mining of lignite and its use for electric power generation and for production of gas, coke, fertilizers ahd chemicals. ZEPS and the other similar regional power associations in the country co-ordinate the development and operation of the sector in their respective regions. They are integrated in JUGEL, the Union of Yugoslav Electric Power Industry, within which general policies and coordination of the power sector are established on a national basis.

2. In Serbia and Kosovo, ZEPS buys all power generated by the producers' plants at tariffs established by general agreement every year, and sells it through Elektristok to the 12 distribution enterprises and to the large industrial consumers at-tariffs that take into account the consumption pattern. Tariffs paid by ZEPS to the producers are based on sufficient revenues by the enterprises to cover operating expenses and debt service and to provide a small proportion of funds for future investments. The present tariffs ZEPS pays the producers range from Din 0.05 to 0.06/kwh for run-of-river, base-load plants; Din 0.10 to 0.16/kwh for regulating, peak-load hydro plants; and an average of Din 0.11/kwh for thermal plant generation. With these tariffs, the internal generation of funds by the producers covers less than 10% of their new investments; the remaining 90% is provided from national and regional funds. It is expected that from 1971 the tariffs will be raised to produce higher internal generation of funds for investments.

3. The total installed capacity in the ZEPS system in mid-1970 is 1,991 Mw, of which 865 Mw are hydro and 1,126 Mw thermal. In addition, 900 Mw hydro and 610 Mw thermal are under construction for initial operation in 1970-73. Total generation in the system in 1969 was 7,149 Gwh and the peak load 1,100 Mw. ZEPS' demand forecasts for its system in 1975 are about 15,000 Gwh, based on a predicted 12.5% annual rate of increase of demand, and 2,900 Mw peak load. The high voltage transmission network in the ZEPS system includes lines at 380 kv, 220 kv and 110 kv. The existing 380 kv lines, from the hydroelectric plant of Djerdap to Belgrade and Nis, started operation recently. It is planned to extend these lines to the large thermal plants in Obrenovac (west of Belgrade) and Obilic, and to the neighboring regional systems. As noted, ZEPS' region has important reserves of lignite -- the fuel used in most of its thermal plants, particularly in Obrenovac and Obilic -- and will export electric power to other regions. This is the case with Kombinat Kosovo's thermal plant in operation (1 x 65 Mw, 1 x 125 Mw and 1 x 200 Mw units) and 2 x 200 Mw units under construction, for initial operation in 1971-72; at least one of its 200 Mw units will generate primarily for Skopje, the large industrial center in Macedonia. It is planned to install 3 x 500 Mw additional units in this plant-for initial operation in 1975-80.

Operation and Use of Gazivode Plant

4. The proposed 34 Mw Gazivode hydroelectric plant, with an average annual generation of 95 Gwh which can be regulated daily, would be used principally for generation of peak power. In event of a disturbance on the power system serving Kosovo and a general loss of supply, the proposed plant would also constitute a reliable independent source of direct power supply to Kombinat Kosovo's complex at Obilic, adequate to prevent a shutdown of the important gasification plant and capable of supplying power to start up the Obilic's thermal plant. The uses of Gazivode plant and the benefits associated with them are analyzed in Annex 10.

5. As Kombinat Kosovo would benefit by having the Gazivode plant built as planned, it would enter into an agreement with ILE whereby it would: (i) build the 32 km, 110 kv transmission line connecting the proposed hydroelectric plant to the power system; (ii) operate and maintain the plant and be reimbursed by ILE for expenses incurred; and (iii) buy all power from Gazivode at rates mutually agreed and consistent with the rates set-by ZEPS for similar types of generation. Kombinat Kosovo in turn would sell any surplus power from Gazivode to ZEPS. It is estimated that the rate to be paid by Kombinat Kosovo to ILE would be at least Din 0.13/kwh.

YUGOSLAVIA

IBAR PROJECT

Rate of Return Calculations and Sensitivity Analyses

A. Justification of the Whole Project

1. The basic method employed to evaluate the multipurpose Ibar project was to estimate its annual costs over a 30-year period and the sum of the annual benefits accruing to the various components over the same period. Wherever possible, costs and benefits were calculated to the economy as a whole -- net of taxes and subsidies, though still in financial terms. On this basis the internal rate of return of the whole project was estimated to be 15.6%. All estimates were in 1971 prices. The total project costs and benefits to the various sectors are listed in Table 1. The means by which benefits in each sector were evaluated are discussed below.

Industrial Water Supply Benefits

2. Evaluation of the benefits arising from the production of water for industrial consumption took into account the fact that, in the event that the proposed Ibar project is not constructed, the industries would continue to operate their present supplies (Preles weir and Batlava scheme -- see Annex 6) and would construct additional facilities to meet their projected demand for water. Preliminary studies indicate that the alternative development would proceed as outlined below.

Year Completed	Project Description	Capital Cost	Annual O&M Cost
		- - - Din million - - -	
1973	Dam on Drenica River Weir, pumping station and treatment plant on Sitnica River	132	3.5
1973	Palatna dam on Lab River Expansion of Prugovac pumping station	138	3.0
1973	Pipeline from Prugovac to Kosovska Mitrovica	72	2.5
1976	Firaja and Stimje dams, conduits to Obilic	345	6.0
1983	Dam on Ibar tributary, pipeline to Kosovska Mitrovica	245	6.0

This alternative development, in addition to existing facilities having an estimated dependable capacity of 3.0 m^3/sec, would provide a total capacity roughly equivalent to that of the proposed Ibar project.

3. The industrial sector is assumed to bear the annual financial charges resulting from capital investments (funds assumed to be provided for 30 years at 8%) plus operating and maintenance costs, including those for the present supplies (which would cease in 1976 if the project is constructed). The resulting total annual costs represent minimum annual benefits to industrial water supply from the project.

Domestic Water Supply Benefits

4. Domestic water supply benefits are estimated as the revenue from water sales. In the Ibar project, this usual method probably gives conservative estimates. Normally, the maximum consumers would be willing to pay rather than do without water altogether can be expected to be higher than the amount they actually pay; it may be higher than usual in this project because of the unsatisfactory nature of the present water supplies and the implications for public health. Public health benefits might also accrue to parties other than direct consumers of the improved supplies. These benefits likewise would not be revealed by the financial return to the enterprise.

Agricultural Benefits

5. The economic benefits resulting from the Ibar project are estimated by comparing the net farm-gate value of crop production in the project area under irrigation with the production which would have prevailed without the project. The data used to calculate the agricultural benefits listed in Table 1 are as follows:

a) Area under irrigation (ha) 1/

	1974	1975	1976	1977	1978
Annual rate	1,500	500	17,000	11,000	--
Cumulative	1,500	2,000	19,000	30,000	30,000

1/ Refers to the area which the farmers are assumed to irrigate. In 1974 and 1975 some 2,000 ha could be irrigated (depending on available run-of-river flows in Ibar, most of which would be utilized by industry and the domestic water supply in Kosovska Mitrovica). From 1976 all irrigation networks would be completed and water stored in the Gazivode reservoir would be sufficient to irrigate the entire project area of 30,000 ha. In the first year water is available, the farmers are assumed to irrigate less than 100% of their land.

b) Yields

Projected yields have been calculated separately for both the social and private sectors. About 10,000 ha would be cultivated by the social sector. This sector cannot increase its output without irrigation. In the private sector it has been assumed that the present low levels of cereal yields would continue to increase, even without the project, with net returns rising at 1.5% per year.

(c) Production Costs

All labor costs were included for Kombinat Kosmet-Export, where production will be highly mechanized. However, in the private sector where much of the production will concentrate on labor intensive vegetable crops, family labor contributions were excluded from farm production costs.

(d) Net Benefits

In computing benefits from the project, a 5-year development period in the social sector and a 7-year development period in the private sector has been assumed from the time that water first becomes available for irrigation. The incremental net value of production would be as follows:

	Din million
Future without project (to be attained in 1983)	34.4
Future with project (at full development in 1983)	155.5
Increment due to project	121.1

Power Benefits

6. As indicated in Annex 9, Gazivode hydroelectric plant, with 34 Mw installed capacity and 95 Gwh average annual generation, would be integrated in the ZEPS power system. The demand in this system in 1975, when Gazivode would start operation, would be about 15,000 Gwh generation and 2,900 Mw peak load. In addition, ZEPS will export power to other regions of the country. The total installed capacity of the system's plants presently in operation, or under construction to start operation before 1975, is 3,500 Mw with approximately equal thermal and hydro shares. The Gazivode plant would, therefore, represent only a marginal increment in the system

(less than 1% from 1976), well within margins of uncertainty inherent in the forecasts, and it obviously would not be meaningful to analyze its value in terms of the effects of the plant in the general planning, operation and economy of the system. However, the small size of Gazivode plant in relation to the system load assures that use will be made, as planned, of the daily regulating capacity of the Gazivode/Pridvorica development to operate the plant principally for the generation of peak power. According to indications from ZEPS, on the basis of its present tariff levels (see Annex 9), the value for the ZEPS system of Gazivode's generation (95 Gwh/year) is estimated at the rate of Din 0.15 per kwh, or Din 14.3 million (US$1.0 million) per year.

7. Of particular importance would be the role of Gazivode plant as an independent reserve source of direct power supply to Kombinat Kosovo's industrial complex at Obilic. Its important gasification plant, which started operation recently, will supply gas to the Skopje steel industry, other industries in Kosovo and Macedonia, and the city of Pristina; from 1975 onward, the plant will produce about 1 billion Nm^3 of gas 1/ and 86,000 tons of asphalt and chemicals per year. It requires a continuous electric power supply of about 25 Mw; if this supply is interrupted for more than five minutes, the gasification plant shuts down and its re-start takes one to two days. This happened twice recently because of disturbances and general loss of supply on the power system with related shut-downs of the Obilic thermal plant, which in turn needs an external supply of about 5 Mw to start up after a shut-down. The Obilic thermal plant, with 790 Mw planned for operation in 1975 and an additional 3 x 500 Mw units in 1975-80, is located in Kosovo Province at the southern end of the ZEPS system, an area where there are practically no other generating plants and the power demand is small but where, as noted, there are abundant lignite reserves. A good part of the generation will be exported by long 230 kv and 380 kv lines to Macedonia (Skopje) and the northern part of Serbia. This situation makes the Obilic thermal plant rather vulnerable to disturbances on the system; for instance, trips of the transmission lines connecting the plant to the distant load centers may cause sudden large dropouts of load in the plant and related plant tripouts due to high frequency. In such cases, the immediate availability of direct power supply from Gazivode hydroelectric plant, with its inherently quick self-starting characteristic, would be adequate to prevent shut-downs of the gasification plant and to start up Obilic thermal units. Because of the importance to the country's economy of the production of gas and power by the Obilic complex, it can be stated that benefits attributable to the reserve role of Gazivode are important though not susceptible to easy quantification. A small, quantifiable fraction of them would be the costs of gasification plant components' damages in shut-downs which

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1/ Nm^3 = cubic meter at normal conditions of pressure (1 atmosphere) and temperature (15° C).

would be saved; based on its experience with the two recent tripouts, Kombinat Kosovo estimates average annual savings in replacements costs of about Din 1.2 million (US$0.1 million). This and the estimated value of Gazivode's normal generation (Din 14.3 million or US$1.0 million -- paragraph 6 above) are included in the annual power benefits of about Din 15.5 million (US$1.0 million) used for calculating the rate of return (Table 1).

Sedimentation Control Benefits

8. Benefits will accrue to the Djerdap Enterprise (the hydroelectric and shiplock complex on the Danube) from the reduction in the accumulation of sediment in the Djerdap reservoir. A contract exists whereby this downstream enterprise would pay a sum of Din 70 million (US$4.7 million) over the period of the proposed Ibar project construction, with annual payments to be in the same proportion as annual construction expenditures are to total construction expenditures. The annual equivalent cost thus incurred by the Djerdap Enterprise (assuming that the capital payments are financed over 30 years at 8%) is taken to be a minimum estimate of benefits arising from sedimentation prevention.

9. Since sedimentation prevention downstream is an unavoidable by-product of the Ibar project, the bargaining position of the downstream enterprises would be great enough to ensure that a considerable "consumers' surplus" would be associated with this arrangement. Furthermore, since the Djerdap dam is unlikely to be the only location downstream of the project to benefit from prevention of sedimentation, this measure of project benefits is conservative.

B. Rate of Return of Ibar Project - Sensitivity Analyses

10. The costs and benefits of the Ibar project (Table 1) show an internal rate of return of 15.6%. The sensitivity of the rate of return to various alternative assumptions was estimated, with the following results:

Assumption	Economic Rate of Return (%)
1. Project construction costs decreased by 10%	17.2
2. Net value of agricultural production increased by 10%	16.2
3. Net value of agricultural production decreased by 10%	15.1
4. Industrial water consumption decreased by 10%	14.5
5. Project construction costs increased by 10%	14.3
6. One year delay in project completion and 10% increase in construction costs	14.0

C. Incremental Rates of Return for Individual Elements

11. It is possible that a multipurpose project may show an acceptable economic rate of return overall, even though it might contain one component or combination of components that would not be justified if the component's benefits were to be compared to its incremental cost to the project 1/. Consequently, the costs of the following hypothetical projects were estimated:

(a) power and industrial water supply only

(b) power and irrigation only

(c) industrial water supply and irrigation only

(d) power only

(e) industrial water supply only

(f) irrigation only

Subtracting in turn the cost of these hypothetical projects from total project costs provides the incremental costs due to:

(a) irrigation

(b) industrial water supply

(c) power

(d) industrial water supply plus irrigation

(e) power plus irrigation

(f) power plus industrial water supply

12. Since the benefits from the domestic water supply and sedimentation control components do not require any significant investment besides that for the Ibar project's three major components, those benefits were ignored in the review of benefits and incremental costs of the components. The methods of determining incremental costs for the other components are described below. The costs include both capital and recurrent costs, while the benefits are those listed individually in Table 1. A summary of the rates of return resulting from comparing incremental costs and benefits for the various components and combination thereof is in paragraph 20 of this Annex.

13. It should be pointed out that at the time of appraisal the engineering studies necessary to produce costs of alternative projects had not

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1/ The method of analysis used in justifying the various components of the project does not allocate costs according to the "separable costs-remaining benefits" method sometimes used in connection with multipurpose projects. The present method is felt to involve somewhat less arbitrariness in the cost allocations and hence be more useful for investment decision-making.

been completed by the consultants. The cost estimates developed for this report are, therefore, approximations only, as are the resulting incremental costs. Although smaller single-purpose and dual-purpose projects could be constructed in less time than the multipurpose Ibar project, this analysis is simplified by not taking such changes into account in the timing of cost and benefit streams. The resulting rates of return are calculated merely to show that the various elements should not be excluded from the project; no other interpretation should be put on them.

Irrigation

14. A project without irrigation would not require the irrigation conduits, pumping stations and irrigation and drainage networks of the multipurpose project. Smaller joint costs (engineering, training, administration, operation and maintenance equipment, etc.) that would not occur if irrigation were excluded can be estimated fairly well. But two large items are more difficult:

a) The multipurpose conduits serve principally to deliver water for industry and irrigation. Conduits to serve industry only would require some 35% of the capacity of the proposed multipurpose project. Either a smaller canal and tunnel system or a pressure pipeline following a different route, probably buried to avoid freezing, could be used. It has been assumed that the cost of conduits serving industry only would be about 50% of the cost of the multipurpose conduits.

b) Gazivode dam would be somewhat smaller if the reservoir were required only for power and industrial water supply. As the volume of water used annually by industrial water supply is some 73% of that consumed by all users, and as the hydroelectric station would require a fairly large dam to develop the necessary head and storage, it has been assumed that 75% of the costs of the proposed Gazivode dam would be required for a project serving power and industrial water supply only.

Industrial Water Supply

15. A project serving power and irrigation only would differ from the proposed Ibar project by having less capacity in the conduits presently designated as "multipurpose" and by having a smaller dam at Gazivode. It has been assumed that the small conduits (with 65% of the capacity of those for the multipurpose scheme) would cost 75% of the multipurpose conduits and that the dam required to serve power and irrigation only would cost 65% of the proposed Gazivode dam.

Power

16. The incremental costs associated with inclusion of the power component are easily identified and consist mainly of the hydroelectric plant

and the transmission line from Gazivode to the existing network. The Pridvorica dam would be 2 m lower, at an estimated cost saving of 40% of this facility, if the compensating basin for daily power regulation were not required. The Gazivode dam and reservoir would be the same size for a water supply and irrigation project as for the proposed multipurpose project.

Industrial Water Supply and Irrigation

17. A single-purpose hydroelectric scheme at Gazivode would consist of a smaller main dam, whose cost has been assumed at only 40% of that for the proposed Gazivode dam. The Pridvorica dam and all other works except the power station would not be required. The project costs would be about 30% of those of the multipurpose project.

Power and Irrigation

18. If the Ibar project were designed for water supply purposes only, the principal features would be the Gazivode dam and conduits to the industrial complexes at Kosovska Mitrovica and Obilic. To provide some 8.8 m^3/sec continuously for industries (which the multipurpose project would accomplish) would mean utilizing some 65% of the mean flow of the Ibar River. It has been assumed that the necessary structure would cost about 70% of that of the proposed Gazivode dam. The conduits required would be the same as those discussed in preceding paragraph 14 and have been assumed to cost 50% of the cost of the proposed multipurpose conduits. Total costs would include the minor incremental costs (engineering, etc.) that are also associated with the power and irrigation component.

Industrial Water Supply and Power

19. A single-purpose irrigation project would require the Pridvorica dam and intake structure, conduits and networks serving irrigation users only, and a much smaller dam at Gazivode. Conduits to the industrial area of the irrigation project, with some 65% of the capacity of those proposed for the multipurpose scheme, are assumed to cost 75% of the multipurpose conduits (as in preceding paragraph 15). The cost of the required Gazivode dam has been assumed to be about 40% of that for the proposed project.

Summary

20. Using the methods of incremental cost determination described above, the rates of return of the incremental costs and benefits of each component and combination of components were estimated as follows:

	Basic Project	Increment being Evaluated	Rate of Return for Incremental Costs and Benefits (%)
A.	Power and Industrial Water Supply	Irrigation	11.5
B.	Industrial Water Supply and Irrigation	Power	14.5
C.	Power and Irrigation	Industrial Water Supply	68.9
D.	Industrial Water Supply	Power and Irrigation	11.8
E.	Power	Industrial Water Supply and Irrigation	18.0
F.	Irrigation	Industrial Water Supply and Power	34.3

April 8, 1971

TABLE 1

Economic Costs and Benefits of the Multipurpose Ibar Project
(In 1971 Prices - Din Million)

Year	Costs 1/				Incremental Benefits					
	Financed By ILE	Financed By Others 2/	Operation & Maintenance	Total Costs	Power	Irrigation	Industrial Water Supply	Domestic Water Supply	Sedimentation Control	Total Benefits
1971	17.7	-	-	17.7	-	-	4.9	-	0.1	5.0
1972	129.9	3.5	-	133.4	-	-	16.8	-	0.8	17.6
1973	267.1	12.5	-	279.6	-	-	30.4	-	2.5	32.9
1974	320.4	12.6	2.4	335.4	-	1.0	45.6	-	4.5	51.1
1975	249.6	16.9	3.6	270.1	-	2.2	57.6	-	6.2	66.0
1976	-	-	17.2	17.2	15.5	11.6	72.2	1.0	6.2	106.5
1977	-	-	17.2	17.2	15.5	28.8	78.2	1.0	6.2	129.7
1978	-	-	17.2	17.2	15.5	49.5	78.2	1.1	6.2	150.5
1979	-	-	17.2	17.2	15.5	69.8	78.2	1.2	6.2	170.9
1980	-	-	17.2	17.2	15.5	88.6	78.2	1.3	6.2	189.8
1981	-	-	17.2	17.2	15.5	101.5	78.2	1.4	6.2	202.8
1982	-	-	17.2	17.2	15.5	112.8	88.9	1.5	6.2	224.9
1983	-	-	17.2	17.2	15.5	118.1	100.0	1.6	6.2	241.4
1984	-	-	17.2	17.2	15.5	118.1	106.0	1.7	6.2	247.5
1985-2000	-	-	17.2	17.2	15.5	118.1	106.0	1.8	6.2	247.6

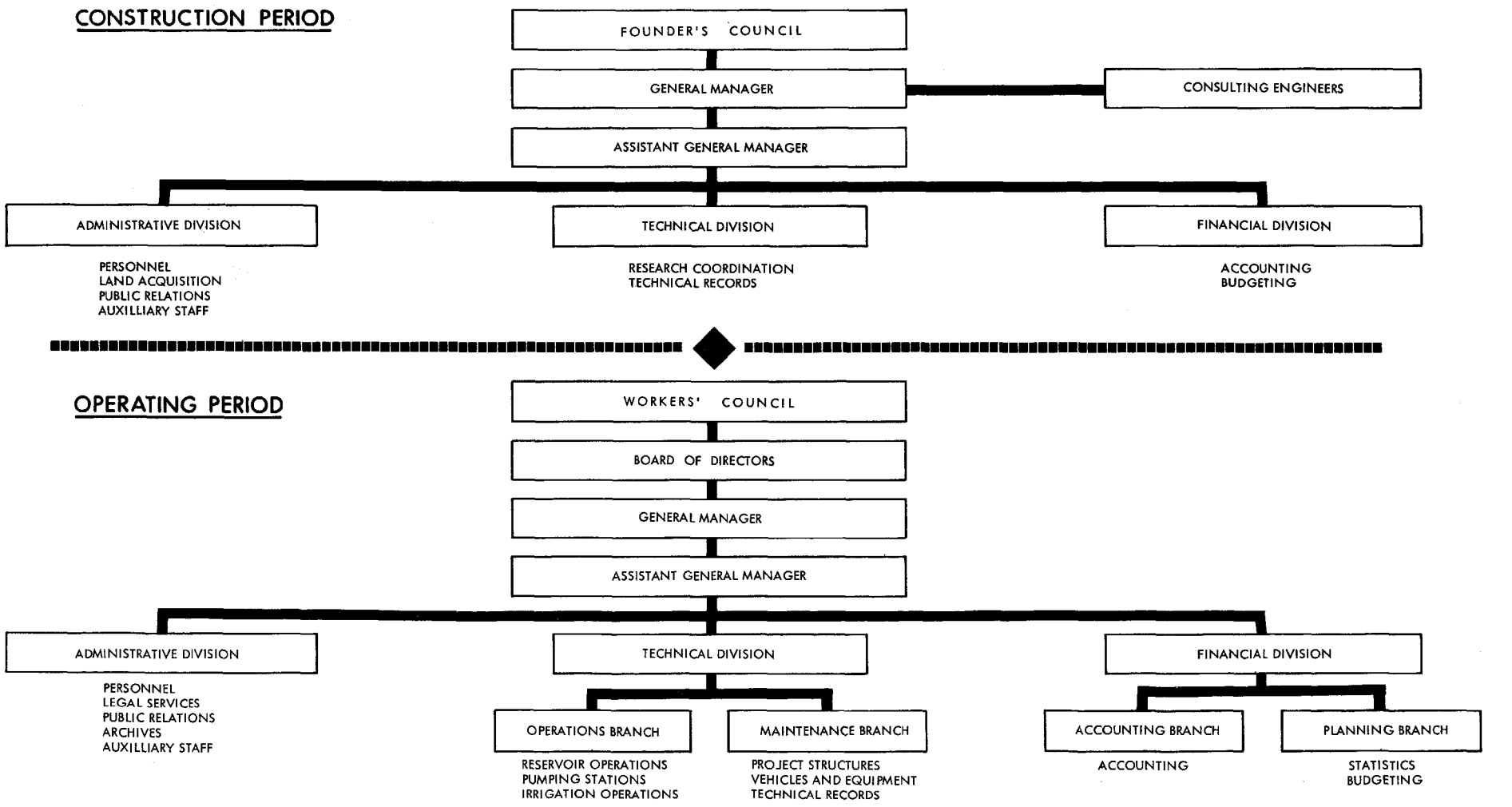
Economic Rate of Return = 15.6% (discount rate at which present values of total cost and total benefit streams are equal).

1/ All costs are in economic terms (i.e. net of taxes, subsidies and other transfer payments). Land costs are allowed for by reducing the net value of agricultural benefits in the project area by Din 3.0 million annually to account for production foregone by the construction of project structures and reservoirs.

2/ Works financed by others include the soil conservation works associated with erosion control (paragraph 3.18), Sitnica River levees (paragraph 3.19) and the transmission line from the Gazivode hydroelectric station (paragraph 3.20).

April 8, 1971

IBAR-LEPENAC ENTERPRISE
ORGANIZATION CHARTS



ANNEX 11

IBRD - 5313(R)

YUGOSLAVIA

IBAR PROJECT

Summary of Financial Principles and Regulations For Enterprises in Yugoslavia

I. Summary of Principles and Regulations

1. The most important form of business organization in Yugoslavia is the "Enterprise". The enterprise is independent and has powers to conduct essentially all transactions necessary to carry on a business.

2. The "means of production" (fixed assets and working capital) are "social property" and therefore cannot be sold to increase the personal income of the working community, which otherwise possesses certain rights in relation to the socially-owned means of production managed by it.

3. The Yugoslav constitution provides that the working organization (enterprise) has the right to decide on the use of socially-owned means and their disposal and to employ these means so as to gain the greatest returns for the working organization and the social community.

4. The Workers' Council, a body elected by the employees of the enterprise, has the right, among other things, to make decisions about the distribution of income after payment of costs of operation other than wages and bonuses, payment of creditors, and payment of taxes.

5. Essentially the distribution of income is made to cover the following:

- obligations towards employees (personal income);
- obligations towards funds of the enterprise.

6. The personal income of the employees is subject to the income of the enterprise after settlement of contractual and legal obligations. If the latter cannot be met from the income after depreciation, which is regarded as part of the operating costs, depreciation funds can be used for repayment of debt.

7. In determining personal income, the Workers' Council normally takes into account:

- that the average minimum rate for a given branch of industry is maintained;
- that sufficient funds are provided for "enlarged reproduction" of the enterprise (funds for plant expansion);
- that sufficient funds for maintaining the social standard of the employees are provided (joint consumption fund for housing, rest homes, additional schooling and professional training); and
- that a reserve fund is established and maintained for financial contingencies.

8. In accordance with the relative priority of the various obligations which have to be met from the income of the enterprise, the Yugoslav accounting system recognizes two stages of "profit or loss". However, these intermediate balances in the calculation are better defined as surplus or deficit, since in the Yugoslav accounting system the cash flow concept is more distinctly recognizable that the earnings concept.

9. The first stage in the calculation determines the balance available to meet legal and contractural obligations; the second stage determines the balance available to meet requirements for the funds of the enterprise. At each stage the inability of the enterprise to provide sufficient income to meet the requirements constitutes a default, which is considered more serious in the first stage than in the second stage.

10. The Yugoslav accounting system recognizes depreciation primarily as a cost of operations. Accumulated depreciation funds are used mainly to finance replacement of assets. In case of material changes of price levels, such as those experienced up to 1965, special laws provide for revaluation of assets and corresponding adjustments in depreciation. Asset valuations are currently under review, following January 1971 devaluation of currency. Repayment of debt from accumulated depreciation is only allowed in exceptional cases.

II. Conclusions

11. The financial principles and regulations followed by Yugoslav enterprises result in a different presentation of financial results than that common in non-socialist countries. However, the basis of accounting is the same double-entry system used by business firms in non-socialist countries.

12. The Yugoslav system recognizes the need to generate from revenue sufficient funds to cover all operating expenses (including depreciation) and to provide funds for debt service and reserves for replacement of assets and additional investments in the business or in social facilities for the employees.

13. A presentation of financial forecasts for ILE in the form common in non-socialist countries is not in conflict with Yugoslav financial practice, even though the format of future actual financial statements for ILE would be different. Covenants for financial performance can be based on the format used for projections, since the future actual financial statements of ILE can be converted into this format for purposes of supervision.

April 5, 1971

IBAR - LEPENAC ENTERPRISE

Summary of Proposed Water and Electricity Rates

(in Dinars)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
I. Water Rates 1/												
1) Agriculture: Average rate per ha per year 2/	500 3/	1,000 3/	533 3/	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,100	1,000
2) Industry: (per m^3) 4/	.49	.49	.49	.49	.49	.49	.49	.49	.44	.44	.38	.38
3) Communities: (per m^3) 4/	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
II. Electricity Rates (per kwh)	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

1/ In addition to these rates all users are charged Din 0.01 per m^3 which is the Water Fund contribution required by the Provincial Government.

2/ The difference between the average rate per ha and the rate actually charged to agricultural users during 1974/78 would be compensated by payments from the Provincial Government (see Annex 14 and paragraph 3.37). The equivalent charge per unit volume for a rate of Din 1,000 per ha is Din 0.32 per m^3; for a rate of Din 1,100 per ha it is Din 0.35 per m^3.

3/ In the first year irrigation water is available in an area (2,000 ha assumed in 1974 and 28,000 ha in 1976) the average rate would be only Din 500 per ha.

4/ These unit rates are subject to adjustment in case of changes in total project cost, or changes in valuation of assets in operation. The intention is to charge industry a minimum total annual amount commensurate with ILE's revenue requirements. The long term contracts (see paragraph 6.05) would guarantee these total payments.

April 7, 1971

ANNEX 13

YUGOSLAVIA

IBAR PROJECT

Assumptions for Financial Forecasts

INCOME STATEMENTS

1. Revenue

(a) Water Sales to Industry

Revenue is based on the rates shown in Annex 13 per total volume of estimated water consumption of industrial users as shown in Annex 5. It has further been assumed that any shortfalls in water consumption by the two main industrial users (Kombinat Kosovo and Kombinat Trepca) would not affect the total amount of revenue estimated to be derived from sales to these industries, since the supply contracts provide for the guaranteed purchase of a minimum volume of water annually (paragraph 6.07).

(b) Water Sales to Communities

Revenue is based on the rates shown in Annex 13 per total volume of estimated water consumption of the communities.

(c) Water Sales to Agricultural Users

Revenue is generally based on annual charges of Din 1,000 per ha of irrigated land from 1974 to 1983 and Din 1,100 per ha thereafter 1/. In the initial period of irrigation the farmers are unlikely to obtain maximum benefits from irrigation (Annex 10) and are therefore unlikely to be able to pay the full water charges. ILE would charge only 50% of the average charges in the first year but full rates would be charged from the second year.

1/ The water charge would be determined in part by the estimated usage of water, with the total water charge giving the average values per ha referred to above. Present practice on the irrigation scheme at Pizren, which ILE is expected to follow, is to have the water charge for each area farmed consist of two components: (a) basic charge equal to 80% of the average charge over the project area (regardless whether or not the land is actually irrigated); and (b) variable charge based on the water usage, estimated for each crop grown. As a result each farmer is billed a different amount per ha for each crop produced.

As the farmers would not even be able to pay these charges to ILE, the Provincial Government would agree to pay to ILE the difference between ILE's water charges and the amount which the farmers would be able to pay (paragraph 3.37). Assuming that water charges will be applied to the total area which can be irrigated, and based on the estimated ability of the farmers to pay these charges, the water charges are assumed to be paid in the following manner:

Year of Irrigation	Paid to ILE		Paid by Farmers		Paid by Provincial Government	
	Din/ha	%	Din/ha	%	Din/ha	%
1st	500	100	300	60	200	40
2nd	1,000	100	600	60	400	40
3rd	1,000	100	800	80	200	20
4th	1,000	100	900	90	100	10
5th	1,000	100	1,000	100	-	-

Assuming that 2,000 ha in the Ibar valley can be irrigated in 1974 and 1975 (irrigation networks for 6,500 ha should be completed for 1974 but water availability is restricted until the Gazivode reservoir is operating) and that the remaining 28,000 ha can be irrigated in 1976, the revenue to be paid to ILE by the farmers and the Provincial Government is estimated as follows:

	1974	1975	1976	1977	1978	1979	Total	%
	in million Dinars							
Payments by agricultural users	0.6	1.2	10.0	18.6	24.4	27.2	82.0	75
Payments by Provincial Government	0.4	0.8	6.0	11.4	5.6	2.8	27.0	25
Total payments to ILE	1.0	2.0	16.0	30.0	30.0	30.0	109.0	100

(d) Sales of Electricity

Revenue is based on the rates shown in Annex 13 per total kwh sold to Kombinat Kosovo.

2. Operating Costs

Operating costs include the following items:

(a) Electricity for Pumping:

which has been assumed to be 12,070,000 kwh per year at the rate of Din .18/kwh = Din 2.2 million.

(b) Insurance:

which was calculated at differing rates for various types of fixed assets. The risks covered are specified by Yugoslav law. The total cost of insurance was assumed to be Din 1.8 million in 1976.

(c) Maintenance:

which was calculated at the following annual rates:

Power station equipment	1.4%
Structural engineering construction	0.5%

The total cost of maintenance was assumed to be Din 7.4 million in 1976.

(d) Salaries and Wages:

which were estimated in accordance with the proposed staffing schedules of ILE. An increase of 10% per year was assumed to take effect from 1978 onwards, reflecting both merit increases in minimum staff renumeration and participation in net income distribution according to Yugoslav laws and regulations (Annex 12). Total personnel costs have been assumed to be Din 3.8 million in 1976.

(e) Other Expenses:

these are based on estimates by ILE for field allowances, per diems, lighting, heating, financial charges other than interest, office supplies, etc. Total other expenses are estimated to be Din 1.1 million in 1976.

(f) Other Operating and Maintenance Costs:

to account for the anticipated takeover of the Preles weir by ILE in 1974, additional operating and maintenance costs of Din 0.8 million have been included in the financial forecasts.

(g) Water Tax:

this item has not been included in the forecasts since it is a transfer item which does not affect the financial statements of ILE.

3. Depreciation

Depreciation is to be charged on a straight-line basis at the rate of 1.5% for civil works, 2.5% for mechanical equipment, 4.5% for electrical equipment and 2% for construction overheads. These rates are adequate.

4. Interest

Interest has been assumed to be 7-1/4% on the Bank loan and 2-1/2% on the Banka Kosova loan. During the construction period through December 31, 1975 interest on the Bank loan is capitalized; no interest is paid by ILE on the Banka Kosova loan until 1976. The Bank loan carries a commitment charge of 3/4% on the undisbursed portion of the loan. This charge is included as part of the amount shown as interest.

5. Taxes

In the absence of reliable information about the rate and form of contributions which ILE might have to make to the Provincial Government and municipalities after 1976, no taxes have been deducted from net income. No contribution to the Federal Government is shown because the present tax is anticipated to be discontinued in 1972.

CASH FLOW

6. Loan Disbursements

The rate of disbursements is based on the assumed rate of progress in the construction schedule. Allowances for contractor mobilization payments, contract retention money and the estimated time lag between incurrence of expenditure and actual disbursement have been made.

7. Contribution for Sedimentation Works

According to the contract between ILE and the Djerdap enterprise the contribution for sedimentation works is going to be made proportionate to the progress of total work on the Ibar project.

8. Interest during Construction

Interest was calculated assuming average disbursement of funds for each year allowing for seasonal variation of quarterly disbursements.

9. Amortization of Loans

It was assumed that the Bank loan would be for 30 years including 6 years of grace and that the Banka Kosova loan would be for 32 years including 7 years grace. Annuity payments calculated according to a semi-annual repayment schedule were assumed for both loans.

10. Project Expenditures

Project expenditures include all costs of the Ibar project according to the cost estimate.

11. Working Capital

Working capital requirements have been assumed to be as follows: Accounts receivable would be equivalent to 1 year's agricultural revenue (due to the irrigation schedule and the need to collect after the harvest season) plus 3 months revenue from industrial and community water supply and power sales (due to a quarterly billing process).

12. Cash Balances

No attempt has been made to allocated cash surpluses to specific reserves or funds. Cash surpluses are most likely to be used for future expansion of the enterprise except for a relatively small appropriation to a joint consumption fund for welfare purposes.

BALANCE SHEETS

13. Allocation of Assets

Fixed assets have been allocated to the three sectors - agriculture, water supply and power - by a percentage allocation of costs (60% to agriculture, 32% to water supply and 8% to power). This allocation was arrived at by attributing to each sector the separable cost and a share of the joint costs. The share of joint costs of dams and overheads was determined on the basis of the share of water stored. For multi-purpose conduits the required maximum capacity for each sector was used to compute its share of joint costs.

The estimated benefit of sedimentation works has been used to separate an equivalent amount of project costs as a non-depreciable asset financed by a contribution from the Djerdap enterprise.

14. Earned Surplus

This item is shown before distribution of net income to funds of the enterprise which will be set up in accordance with Yugoslav regulations by the Worker's Council after its establishment at the time of completion of the construction phase.

April 8, 1971

IBAR-LEPENAC ENTERPRISE

Estimated Income Statements 1974 - 1985 1/

Years Ending December 31,	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Total water consumption (million m^3)	61.2	69.3	235.1	263.9	288.3	302.2	311.8	325.5	340.2	353.2	366.2	379.4
thereof - Agriculture	4.5	6.3	59.4	77.4	90.4	95.0	95.0	95.0	95.0	95.0	95.0	95.0
- Industry	56.7	63.0	172.8	183.3	194.3	203.2	212.5	225.9	240.2	252.8	265.4	278.3
- Communities	-	-	2.9	3.2	3.6	4.0	4.3	4.6	5.0	5.4	5.8	6.1
Electricity Sales (million kwh)	-	-	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
	(million Dinars)											
Revenue from sale of water to:												
- Agriculture	1.0	2.0	16.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	33.0	33.0
- Industry	27.7	30.9	84.7	89.8	95.2	99.6	104.1	110.7	105.7	111.2	100.9	105.7
- Communities	-	-	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Revenue from sale of electricity	-	-	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
Total Revenue	28.7	32.9	114.0	133.2	138.7	143.2	147.8	154.5	149.6	155.2	148.0	152.9
Operating Costs:												
- Agriculture	1.0	1.9	8.8	9.7	12.1	12.5	12.9	13.3	13.7	14.1	14.5	14.9
- Industry and Communities	1.4	1.7	6.5	6.1	6.3	6.5	6.6	6.8	7.0	7.2	7.5	7.7
- Power	-	-	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
- General	2.0	2.0	-	-	-	-	-	-	-	-	-	-
Total Operating Costs	4.4	5.6	17.2	17.7	20.3	20.9	21.4	22.0	22.6	23.2	23.9	24.5
Less capitalized expenses	2.0	2.0	-	-	-	-	-	-	-	-	-	-
Net Operating Costs	2.4	3.6	17.2	17.7	20.3	20.9	21.4	22.0	22.6	23.2	23.9	24.5
Depreciation:												
- Agriculture	-	-	7.1	7.1	10.8	14.4	14.4	14.4	14.4	14.4	14.4	14.4
- Industry and Communities	0.3	0.3	7.3	7.4	7.3	7.4	7.3	7.4	7.3	7.4	7.3	7.4
- Power	-	-	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Total Depreciation	0.3	0.3	17.7	17.8	21.4	25.1	25.0	25.1	25.0	25.1	25.0	25.1
Net Operating Income:												
- Agriculture	-	0.1	0.1	13.2	7.1	3.1	2.7	2.3	1.9	1.5	4.1	3.7
- Industry and Communities	26.0	28.9	71.8	77.3	82.7	86.9	91.5	97.9	92.9	98.2	87.8	92.4
- Power	-	-	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Net Operating Income	26.0	29.0	79.1	97.7	97.0	97.2	101.4	107.4	102.0	106.9	99.1	103.3
Interest:												
Interest (paid)	19.6	32.9	64.7	66.0	65.3	64.1	62.5	61.1	59.4	57.8	55.9	54.0
Less interest capitalized	19.6	32.9	22.9	-	-	-	-	-	-	-	-	-
Net Interest	-	-	41.8	66.0	65.3	64.1	62.5	61.1	59.4	57.8	55.9	54.0
NET INCOME	26.0	29.0	37.3	31.7	31.7	33.1	38.9	46.3	42.6	49.1	43.2	49.3
Rate of return on average net fixed assets in operation (%):												
- Agriculture	-	-	-	1.6	0.8	0.4	0.3	0.3	0.2	0.2	0.5	0.5
- Water Supply (and communities)	-	-	15.9	17.2	18.7	20.0	21.4	23.3	22.5	24.2	22.0	23.7
- Power	-	-	7.0	7.2	7.4	7.7	8.0	8.3	8.6	9.0	9.4	9.8
- Overall	-	-	5.6	7.0	7.0	7.2	7.6	8.2	8.0	8.5	8.1	8.6

1/ Prior to 1974 ILE would not receive any revenue or incur any expenses for operations.

March 29, 1971

ANNEX 15

IBAR-LEPENEC ENTERPRISE

Estimated Cash Flow 1971 - 1985

(in million Dinars)

Years Ending 31 December,	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
SOURCES OF FUNDS															
Net Operating Income	-	-	-	26.0	29.0	79.1	97.7	97.0	97.2	101.4	107.4	102.0	106.9	99.1	103.3
Depreciation	-	-	-	0.3	0.3	17.7	17.8	21.4	25.1	25.0	25.1	25.0	25.1	25.0	25.1
Internal Cash Generated	-	-	-	26.3	29.3	96.8	115.5	118.4	122.3	126.4	132.5	127.0	132.0	124.1	128.4
IBRD Loan	4.3	54.3	136.3	198.7	228.4	53.0	-	-	-	-	-	-	-	-	-
Banka Kosova Loan	25.0	103.0	212.0	227.0	123.0	5.0	-	-	-	-	-	-	-	-	-
Liabilities to Contractors	0.4	7.4	9.0	22.1	8.4	(47.3)	-	-	-	-	-	-	-	-	-
Total Increase in Debt	29.7	164.7	357.3	447.8	359.8	10.7	-	-	-	-	-	-	-	-	-
Capital Contribution	1.6	9.3	18.4	22.7	18.0	-	-	-	-	-	-	-	-	-	-
Total Sources of Funds	31.3	174.0	375.7	496.8	407.1	107.5	115.5	118.4	122.3	126.4	132.5	127.0	132.0	124.1	128.4
APPLICATION OF FUNDS															
Debt Service:															
Amortization - IBRD Loan	-	-	-	-	-	-	11.0	11.8	12.6	13.6	14.6	15.7	16.9	18.1	19.4
Amortization - Banka Kosova Loan	-	-	-	-	-	-	-	10.1	20.5	21.1	21.5	22.1	22.5	23.2	23.8
Total Amortization	-	-	-	-	-	-	11.0	21.9	33.1	34.7	36.1	37.8	39.4	41.3	43.2
Interest - IBRD Loan	2.1	5.8	9.7	19.6	32.9	47.4	48.7	47.9	47.1	46.1	45.1	44.0	42.8	41.6	40.3
Interest - Banka Kosova Loan	-	-	-	-	-	17.3	17.3	17.4	17.0	16.4	16.0	15.4	15.0	14.3	13.7
Total Interest	2.1	5.8	9.7	19.6	32.9	64.7	66.0	65.3	64.1	62.5	61.1	59.4	57.8	55.9	54.0
Total Debt Service	2.1	5.8	9.7	19.6	32.9	64.7	77.0	87.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2
Project Expenditure	23.8	167.6	361.3	462.3	385.0	-	-	-	-	-	-	-	-	-	-
Other Capital Expenditures	-	-	-	3.0	-	-	-	-	-	-	-	-	-	-	-
Total Capital Expenditures	23.8	167.6	361.3	465.3	385.0	-	-	-	-	-	-	-	-	-	-
Increase in working capital other than cash	0.2	-	-	4.9	2.9	40.3	4.3	1.4	1.0	-	-	-	-	-	-
Total Application of Funds	26.1	173.4	371.0	489.8	420.8	105.0	81.3	88.6	98.2	97.2	97.2	97.2	97.2	97.2	97.2
Annual Surplus (deficit)	5.2	0.6	4.7	7.0	(13.7)	2.5	34.2	29.8	24.1	29.2	35.3	29.8	34.8	26.9	31.2
Cash Balance at end of year 1/	5.2	5.8	10.5	17.5	3.8	6.3	40.5	70.3	94.4	123.6	158.9	188.7	223.5	250.4	281.6
Debt Service Coverage (internal cash: debt service)	-	-	-	-	-	-	1.5	1.4	1.3	1.3	1.4	1.3	1.4	1.3	1.3

1/ From 1977 onwards, cash balances would be substantially reduced by internal financing of additional capital expenditures which have not been included in these estimates in the absence of definite plans.

March 29, 1971

ANNEX 16

IBAR-LEPENAC ENTERPRISE

Estimated Balance Sheets 1971 - 1985

(in million Dinars)

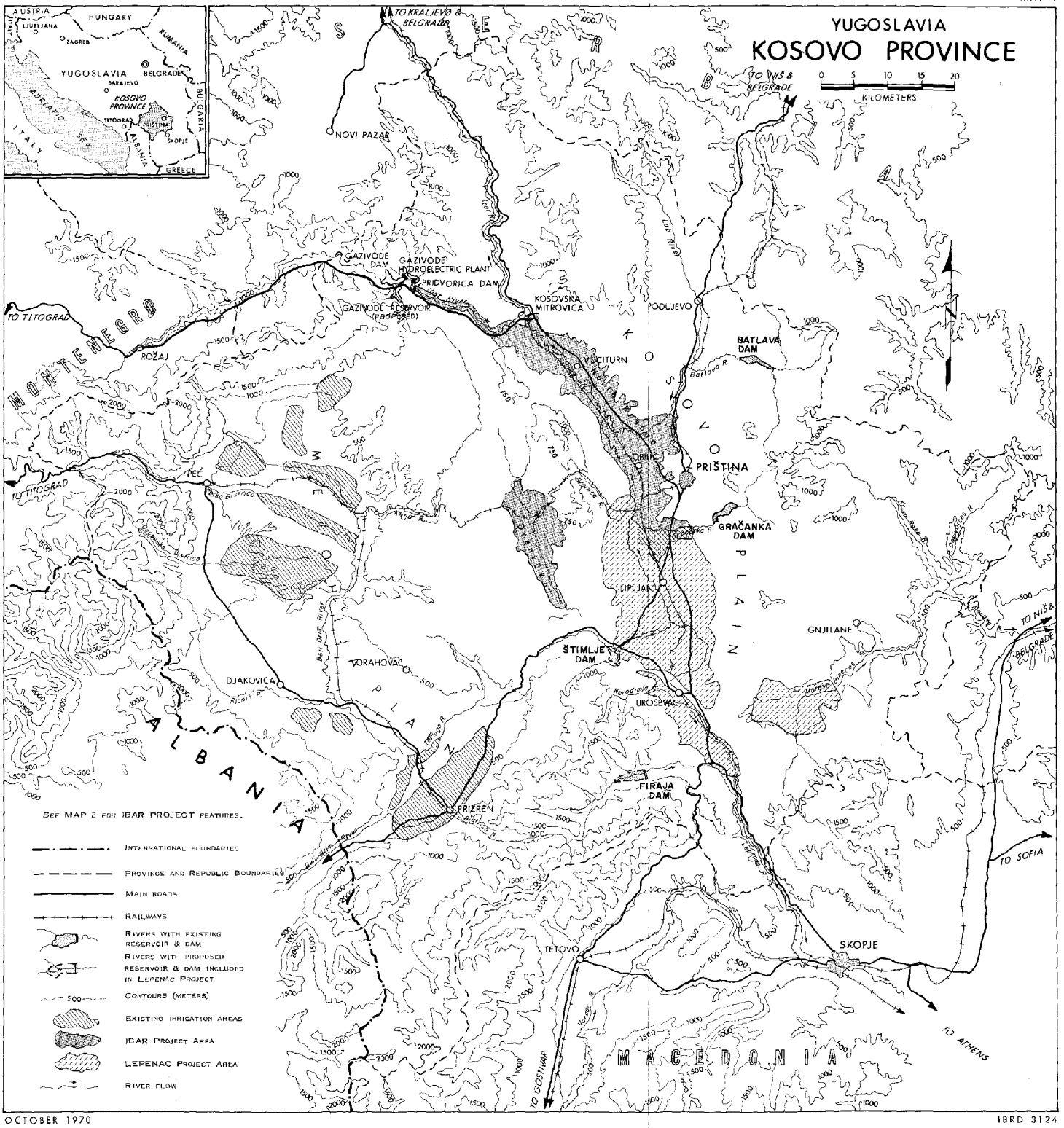
As at 31st December	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
ASSETS															
Fixed Assets in Operation:															
- Agriculture	0.5	0.6	0.6	135.9	843.7	860.0	860.0	860.0	860.0	860.0	860.0	860.0	860.0	860.0	860.0
Less accumulated depreciation	-	-	-	-	-	7.1	14.2	25.0	39.4	53.8	68.2	82.6	97.0	111.4	125.8
	0.5	0.6	0.6	135.9	843.7	852.9	845.8	835.0	820.6	806.2	791.8	777.4	763.0	748.6	734.2
- Water	0.3	0.4	0.4	84.6	451.9	461.0	461.0	461.0	461.0	461.0	461.0	461.0	461.0	461.0	461.0
Less accumulated depreciation	-	-	-	0.3	0.6	7.9	15.3	22.6	30.0	37.3	44.7	52.0	59.4	66.7	74.1
	0.3	0.4	0.4	84.3	451.3	453.1	445.7	438.4	431.0	423.7	416.3	409.0	401.6	394.3	386.9
- Power	-	0.1	0.1	0.1	103.2	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0
Less accumulated depreciation	-	-	-	-	-	3.3	6.6	9.9	13.2	16.5	19.8	23.1	26.4	29.7	33.0
	-	0.1	0.1	0.1	103.2	101.7	98.4	95.1	91.8	88.5	85.2	81.9	78.6	75.3	72.0
Total Net Fixed Assets in Operation	0.8	1.1	1.1	220.3	1,398.2	1,407.7	1,389.9	1,368.5	1,343.4	1,318.4	1,293.3	1,268.3	1,243.2	1,218.2	1,193.1
Work in progress	23.5	187.3	539.9	782.6	4.3	-	-	-	-	-	-	-	-	-	-
Sedimentation works	1.6	10.9	29.3	52.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Total Net Fixed Assets	25.9	199.3	570.3	1,054.9	1,472.5	1,477.7	1,459.9	1,438.5	1,413.4	1,388.4	1,363.3	1,338.3	1,313.2	1,288.2	1,263.1
Current assets other than cash	0.2	0.2	0.2	5.1	8.0	48.3	52.6	54.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
Cash 1/	5.2	5.8	10.5	17.5	3.8	6.3	40.5	70.3	94.4	123.6	158.9	188.7	223.5	250.4	281.6
Total Current Assets	5.4	6.0	10.7	22.6	11.8	54.6	93.1	124.3	149.4	178.6	213.9	243.7	278.5	305.4	336.6
TOTAL ASSETS	31.3	205.3	581.0	1,077.5	1,484.3	1,532.3	1,553.0	1,562.8	1,562.8	1,567.0	1,577.2	1,582.0	1,591.7	1,593.6	1,599.7
LIABILITIES															
Earned Surplus 2/	-	-	-	26.0	55.0	92.3	124.0	155.7	188.8	227.7	274.0	316.6	365.7	408.9	458.2
Contribution for sedimentation works	1.6	10.9	29.3	52.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Long-term Debt															
IBRD loan	4.3	58.6	194.9	393.6	622.0	675.0	664.0	652.2	639.6	626.0	611.4	595.7	578.8	560.7	541.3
Banka Kosova	25.0	128.0	340.0	567.0	690.0	695.0	695.0	684.9	664.4	643.3	621.8	599.7	577.2	554.0	530.2
Total Long-Term Debt	29.3	186.6	534.9	960.6	1,312.0	1,370.0	1,359.0	1,337.1	1,304.0	1,269.3	1,233.2	1,195.4	1,156.0	1,114.7	1,071.5
Liabilities to contractors	0.4	7.8	16.8	38.9	47.3	-	-	-	-	-	-	-	-	-	-
TOTAL LIABILITIES	31.3	205.3	581.0	1,077.5	1,484.3	1,532.3	1,553.0	1,562.8	1,562.8	1,567.0	1,577.2	1,582.0	1,591.7	1,593.6	1,599.7
Debt: Equity Ratio	100:0	100:0	100:0	98:2	96:4	94:6	92:8	90:10	87:13	85:15	82:18	79:21	76:24	73:27	70:30

1/ From 1980 onwards, cash balances could partly be used to finance additional capital expenditures which are not included in these estimates.

2/ Earned surplus is shown before distribution of net income to funds of the enterprise which will be set up in accordance with Yugoslav regulations by the Workers' Council after its establishment at the time of completion of the construction phase.

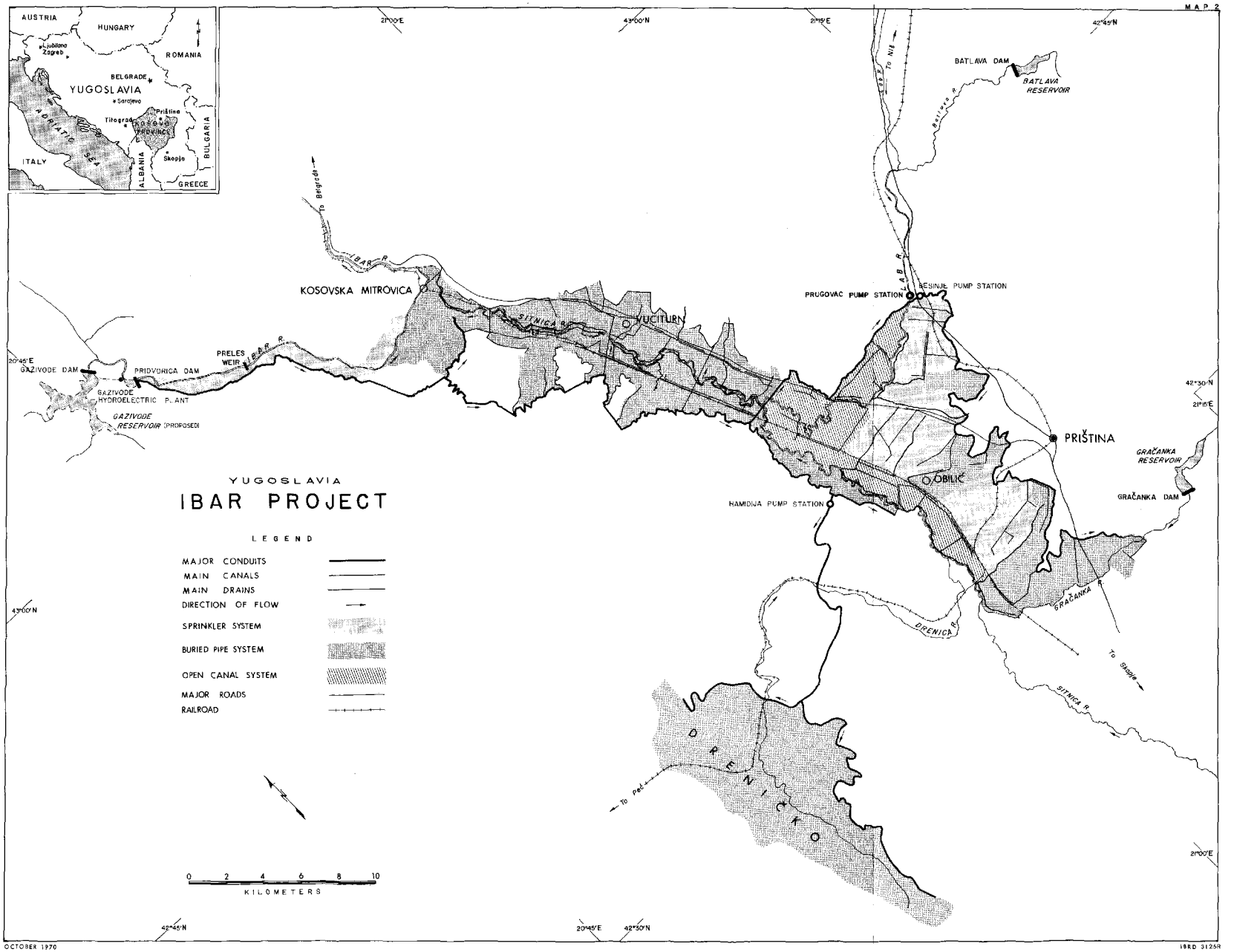
March 29, 1971

ANNEX 17



OCTOBER 1970

IBRD 3124



OCTOBER 1970

IBRD 3125R